Government of Saskatchewan

Annual Report 1983-84

Saskatchewan Environment

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Annual Report Saskatchewan Environment 1983-84

Neal Hardy
Minister

Peter S. van Es
Deputy Minister

Alan Carr
Deputy Minister
December 1982 - July 1984

Table of Contents

Letters of Transmittal 4
Organization Chart 6
Environmental Information, Coordination & Assessment Service 7
Environmental Information & Extension Branch 8
Environmental Coordination Branch 10
Environmental Assessment Branch 11
Environmental Protection Service 15
Air Pollution Control Branch 17
Land Protection Branch 21
Mines Pollution Control Branch 27
Water Pollution Control Branch 30
Water Management Service 35
Hydrology Branch 38
Water Rights Branch 44
Qu'Appelle Implementation 52
Administration Branch 54

List of Tables

Table 1 — Projects Requiring an Impact Assessment or Undergoing Screening at Year End 12
Table 2 — Projects Screened — Impact Assessments not Required 13
Table 3 — Assessment Process Completed 14
Table 4 — Projects Deferred or Cancelled 14
Table 5 — Urban Air Monitors in Saskatchewan Cities 17
Table 6 — Classification of Permits 18
Table 7 — Spill Statistics by Product, Number of Incidents and Quantity 22
Table 8 — Petroleum Product Spill Statistics by Cause, Number of Incidents and Quantity 23
Table 9 — Mapping and Studies Program Status 25
Table 10 — Water Quality Sampling Statistics 31
Table 11 — Waterbodies in the Qu'Appelle Basin-range of concentration 32
Table 12 — Canada-Saskatchewan Hydrometric Network, Breakdown of Funding Responsibilities 39
Table 13 — Summary of Study Requests During 1983-84 41
Table 14 — Surface Water Project Administration Statistics 44
Table 15 — Drainage Basins Showing All Authorized and Licensed Water Development Projects 45
Table 16 — International Streams Administration 46
Table 17 — Ground Water Project Administration Statistics 48
Table 18 — Hydroelectric Power Generated 49
Table 19 — Hydroelectric Projects Operations in 1983 50
Table 20 — Application for Drainage Permits 50
Table 21 — Drainage Complaints 50
Table 22 — Appeals to Saskatchewan Drainage Appeal Board 51
Table 23 — Statement of Expenditures and Revenues for the Fiscal Year Ending March 31, 1984 56

Neal Hardy, Minister of Environment

His Honour
Frederick W. Johnson
Lieutenant Governor
Province of Saskatchewan
Regina, Saskatchewan

Dear Sir:

I have the honour to transmit the annual report of Saskatchewan Environment for the period commencing April 1, 1983 and ending March 31, 1984.

Yours sincerely,

Neal Hardy

Neal Hardy
Minister

Peter S. van Es
Deputy Minister of Environment

Hon. Neal Hardy
Minister
Saskatchewan Environment

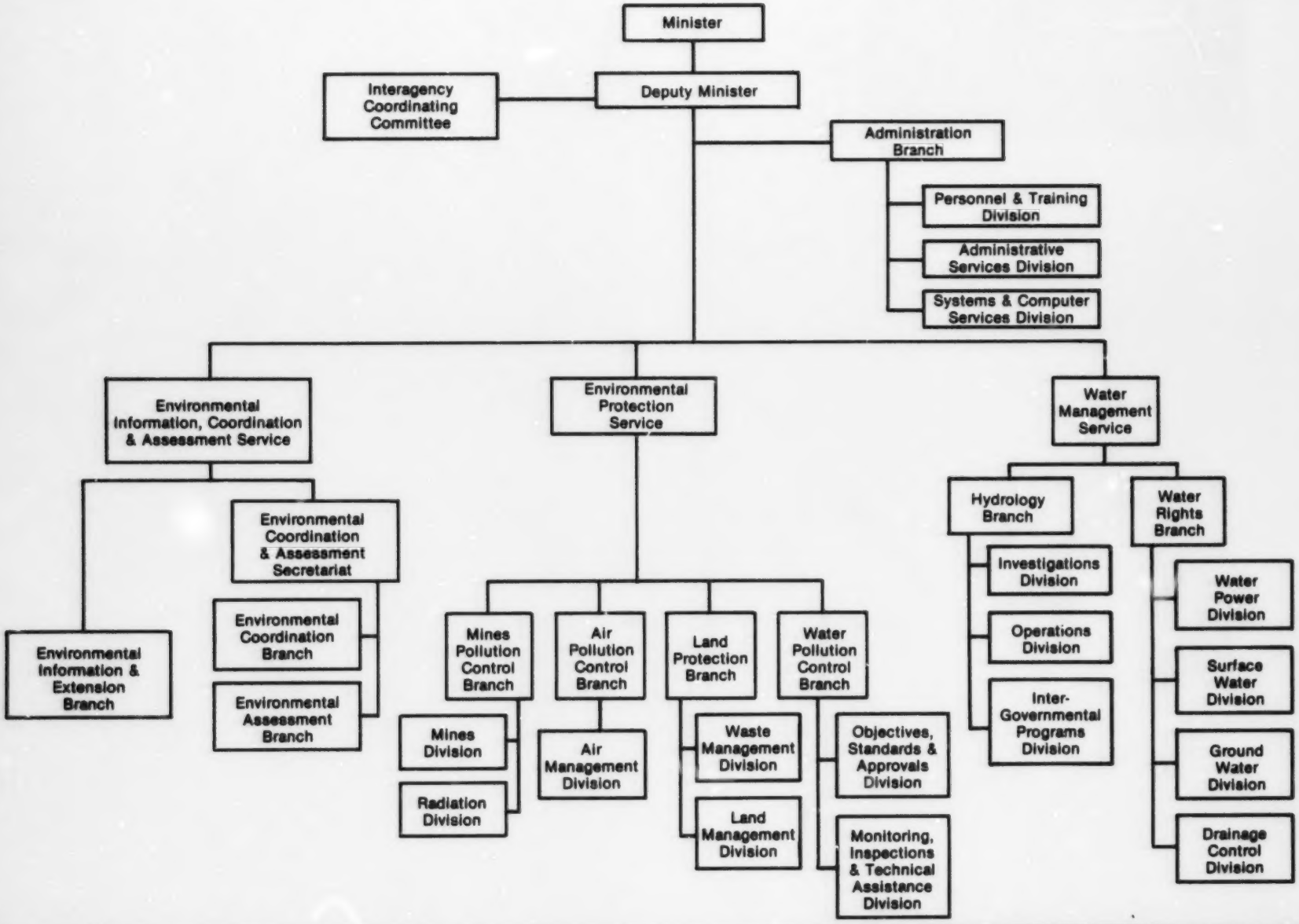
Dear Mr. Hardy:

I am pleased to present the annual report of Saskatchewan Environment for the fiscal year ended March 31, 1984.

Respectfully submitted,

Peter S. van Es
Deputy Minister

Organization Chart



Environmental Information Coordination and Assessment Service

H.S. Maliepaard, Executive Director

C.H. Olson, Acting Director
Environmental Information & Extension Branch

R.E. Walker, Acting Director
Environmental Coordination Branch

S.L. McLeod, Acting Director
Environmental Assessment Branch

Environmental Information, Coordination and Assessment Service

The Environmental Information, Coordination and Assessment Service was formed during 1983-84 as a result of reorganization of the former Environmental Assessment Secretariat, the Policy, Planning and Research Branch and the Public Information and Education Branch. This new Service consists of three branches: Environmental Coordination Branch, Environmental Assessment Branch and the Environmental Information and Extension Branch.

The Service is responsible for:
- developing and coordinating departmental programs and activities to protect and enhance the quality of Saskatchewan's environment;
- increasing public awareness of department programs, activities and regulations;
- administering The Environmental Assessment Act and The Ecological Reserves Act;
- developing guidelines to ensure protection of the environment during construction and development;
- representing the department on interagency and interjurisdictional committees related to multidisciplinary environmental matters.

Environmental Information & Extension Branch

- responds to inquiries and provides information on the policies, programs and activities of the department;
- facilitates public involvement in environmental assessments and public enquiries through announcements, advertisements and public meetings;
- acts as a resource to educational institutions and other agencies in the development of environmental education programs serving all sectors of society.

This fiscal year, the branch name was changed from Public Information and Education Branch to the Environmental Information & Extension Branch. The change reflected the shift in the focus to environmental extension, providing educational programs to all public groups, rather than concentrating on programs only within the formal education system. As well, the branch phased out its two separate divisions to become one unit.

News Releases

During the fiscal year, 33 news releases were prepared by branch staff for distribution to the media. Eleven of these releases dealt with the spill of uranium mine process water at the Key Lake Mine, its clean-up and subsequent monitoring. Efforts were made to keep the public informed of all major events affecting the environment, and the activities of the department in monitoring and protecting it.

Advertising & Public Announcements

Newspaper advertising was used to inform the public of proposed developments and to encourage participation in public reviews of environmental impact assessments.

Public Review and Public Notice announcements were issued on such projects as Regina Rail Relocation, Frenchman River Basin Irrigation and the Codette-Beatty Transmission Line.

Advertising was also developed for public involvement programs held during the fiscal year.

Publications

Several existing publications were revised during the fiscal year, including the teaching resource kit, Landscapes: A Guide to the Landforms & Ecology of Southern Saskatchewan. A series of water conservation fact sheets were developed and distributed to Saskatchewan communities. Branch staff continued to have reports and information materials published for other branches in the department.

Snoop

Snoop, a monthly series of environmental education materials featuring this fictitious character, was returned to its developer for distribution to schools. The package is still available from the company for a nominal subscription fee.

Man & the Environment

Distribution of this series of 20 supplements to the Division III Science curriculum continued through the fiscal year.

Pesticide Container Disposal Program

As 1983-84 was the first year of the Pesticide Container Disposal Program, a public information program was required to introduce and promote it. Branch staff developed a brochure, newspaper and radio advertising, and collection site signs for the program.

Clean Machine

The Clean Machine was introduced in 1983 to replace Pitch-In as the department sponsored anti-litter program. The new theme was chosen to provide a program image which was distinctly Saskatchewan. Information kits were distributed to 5,992 individuals, schools, groups and organizations, inviting them to organize clean-up projects in their respective communities. Application forms for free department supplied litter bags were included in the kits. A certificate of appreciation was sent to all participating groups in recognition of their efforts.

Media used to promote the program included radio and newspaper advertisements, billboards, bus cards, a news conference, and media interviews.

Environmental Advisory Council

The Environmental Advisory Council, after halting activities pending a review of the council, was not active during 1983-84.

Expected revisions to the Department of the Environment Act precluded any decision on the format of the council. A decision is expected in 1984-85, after new legislation is in place.

Environmental Coordination Branch

- coordinates government review of proposed developments to determine need for an environmental impact assessment;
- assists developers by identifying and interpreting government regulatory requirements;
- assists other branches in program review and development.

Heavy Oil Study

The department maintained its ongoing interest in the environmental aspects of the enhanced recovery of heavy oil in the Lloydminster area. An overview study contracted in 1983-84 reviewed existing information, identified key environmental concerns, and recommended priority follow-up studies. It is expected that this report will form the basis of Saskatchewan Environment's future initiatives in this area. The department is participating with Saskatchewan Energy and Mines and other provincial agencies in preparing a comprehensive policy and regulatory framework as part of an overall strategy for development of the province's heavy oil resources.

Environmental Guidelines

During the 1983-84 fiscal year, the branch completed guidelines pertaining to development of sand and gravel pits. These guidelines identify desirable procedures which should assist public and private developers and operators of sand and gravel pits in preventing unnecessary environmental disruption, and promoting a productive afteruse of the area.

Reclamation guidelines were completed for coal mining in the Coronach area. In addition, agreement was reached with mine operators for adoption of similar reclamation guidelines in the Estevan area.

Revision of the guidelines for collection of environmental data for heavy oil thermal pilot projects was initiated this fiscal year. These guideline revisions will reflect an improved understanding of the activities, problems and information requirements associated with heavy oil thermal pilot projects.

Mackenzie River Basin Task Force

The Task Force met four times during 1983-84. The purpose of the meetings was to suggest and evaluate means to implement recommendations in the Mackenzie River Basin Committee report released in February, 1982. A draft implemention agreement was prepared in cooperation with the governments of Canada, Alberta, British Columbia, Yukon Territory and Northwest Territories.

Toxicology Centre

The department again provided a grant to support the Toxicology Centre established in the 1982-83 fiscal year. The centre, located at the University of Saskatchewan, is jointly funded by the University and the Province. The Board of Directors consists of representatives from the departments of Agriculture, Consumer and Commercial Affairs, Environment, Health, and Labour, four members from the University and a public member.

The Toxicology Centre is a significant information source on toxicology matters for the western provinces. Some of the activities undertaken during the last fiscal year related to health effects of agricultural chemicals (i.e. 2,4-D, malathion); effects of acid rain, heavy metals and radionuclides; environmental causes of multiple sclerosis; potential release of toxic materials from a pesticide storage facility; a variety of studies related to occupational health and safety; and provision of analytical services in Western Canada.

Environmental Assessment Branch

- develops guidelines for impact studies and reviews environmental impact statements;
- coordinates government and public participation in the impact assessment and review process;
- monitors approved projects to ensure compliance with prescribed mitigative measures and maintains contact with regulatory agencies involved.

Guidelines

The branch revised the guidelines for conducting an environmental impact assessment. These guidelines are intented to acquaint proponents with information needs and procedures of the environmental assessment process. They enable a developer to consider environmental implications of a proposed project in making decisions on that project. Guidelines for preparing a project proposal were also revised.

Cold Lake/Beaver River Study

This study was initiated by Alberta Environment to evaluate water management options for the Beaver River watershed due to large amounts of water required for extraction of heavy oil west of Cold Lake, Alberta. At Alberta's request, Saskatchewan Environment participated as an observer.

The study evaluated four water management options, one short-term and three long-term. In April, 1983 the Alberta government adopted the short-term option as a temporary measure, and early in 1984 Alberta Environment began a detailed study to evaluate the long-term options. Saskatchewan Environment is a full member of the study team.

Cold Lake Esso Expansion

In August, 1983 the Alberta Energy Resources Conservation Board conducted a public hearing at Grand Centre, Alberta to obtain opinions on the proposed expansion of Esso Resources' Leming heavy oil extraction plant west of Cold Lake, Alberta. Saskatchewan Environment presented an intervention at the hearing, supporting the proposal on the condition that the plant would not adversely affect Saskatchewan's environment and water supply. Saskatchewan Environment expressed concern about possible cumulative impacts arising from subsequent phases of development in the Cold Lake area by Esso and other proponents.

Slave River Hydro Development

Work continued on developing guidelines for environmental impact assessment should Alberta decide to go ahead with the development on the Slave River. Saskatchewan Environment reviewed draft guidelines prepared by the Alberta government and provided additions to these guidelines.

Project Review and Assessment

During the fiscal year, 45 new project proposals were received by the Environmental Coordination and Assessment Branches. The status of the various project proposals received or under review during the year is as follows:

Table 1 - Projects Requiring an Impact Assessment or Undergoing Screening at Year End

Proponent	Project
Canadian Occidental Petroleum	Uranium Mining (McClean Lake Uranium Development)
Eldorado Nuclear	Transmission Line - Uranium City to Collins Bay
Esso Minerals Canada Inc.	Uranium Mine and Mill at McMahon Lake (Midwest Lake Project)
May and Baker Canada Inc.	Herbicide Plant - Regina
Moose Mountain Water Resources Management Board	Increased water levels - Kenosee and White Bear Lakes
Murphy Oil Co. Ltd.	Dual Pipeline System - Eyehill to Unity
Potash Corporation of Saskatchewan	Bredenbury Potash Mine
Regina, City of	Waste Management Study
Rural Municipality of Hoodoo	Wakaw Lake Weir
Saskatchewan Mining Development Corp.	Dawn Lake Uranium Project
Saskatchewan Power Corporation	Estevan Thermal Generating Station and Rafferty Dam and Reservoir
Saskatchewan Power Corporation	Girard Creek Relocation
Saskatchewan Power Corporation	230 KV Transmission Line - Coteau to North Battleford
Saskatchewan Power Corporation	Transmission Line Reinforcement - Squaw Rapids to La Ronge to Beauval
SERU Nucleaire (Canada) Ltd.	Uranium Mining - Waterbury Lake

Table 2 - Projects Screened - Impact Assessments Not Required

Proponent	Project
Barleen Developments	Spiritwood Acres Recreational Development
Canada - Cities Service Ltd.	Gas Pipeline and Compressor Station - Fort Pitt Area
C.P. Rail	Ballast Pit - McKague, Saskatchewan
Canadian Reserve Oil and Gas Ltd.	Steam Flood Pilot - Lone Rock Area
Ducks Unlimited	Bergien Wetland Development Project
Ducks Unlimited	Big Fish Wetland Development Project
Ducks Unlimited	Blanchette Wetland Development Project
Ducks Unlimited	Canola Wetland Development Project
Ducks Unlimited	Chaplin Marshes Wetland Development Project
Ducks Unlimited	Gotzwold Lake Wetland Development Permit
Ducks Unlimited	Hookenson Marsh Wetland Development Project
Ducks Unlimited	Lac Vert Wetland Development Project
Ducks Unlimited	Mapletoft Wetland Development Project
Ducks Unlimited	Painter Lake Project B Wetland Development Project
Ducks Unlimited	Range Slough Wetland Development Project
Ducks Unlimited	Rath Wetland Development Project
Ducks Unlimited	Reynolds Marsh Wetland Development Project
Ducks Unlimited	Torwalt Wetland Development Project
Ducks Unlimited	Tytlandsvik Wetland Development Project
Ducks Unlimited	Wetzel Wetland Development Project
Golden Eagle Oil and Gas Ltd.	Oil Development in Kiyiu Lake
Husky Oil	Tangleflags North - In Situ Combustion Pilot Project
Indian and North Affairs	Winter Access Road - Uranium City to Stony Rapids
J.C. International	Oil Development in Kiyiu Lake
Merland Explorations Ltd.	Sandhills Gas Well Project - 1984
Northwest Food and Fuel	Kerrobert Alcohol Plant
Page Petroleum	Oil Development in Kiyiu Lake
P.F.R.A. - City of Estevan	Water Supply Intake
Prince Albert Skin and Scuba Diving Club	Artificial Reef - Candle Lake
Saskatchewan Highways and Transportation	Adair Creek Gravel Deposit
Saskatchewan Highways and Transportation	Borden Bridge Replacement
Saskatchewan Highways and Transportation	Highway #13 Reconstruction - Eastend to Claydon Grid
Saskatchewan Highways and Transportation	Relocation of Highway #101 - Canoe Lake Area
Saskatchewan Highways and Transportation	Reconstruction of Highway #102
Saskatchewan Highways and Transportation	Upgrading of Highway #219 - Saskatoon to Beaver Creek
Saskatchewan Parks and Renewable Resources	Pike Rearing March - Van Potten's Creek
Shell Oil Ltd.	Bulk Petroleum Storage and Retail Distribution of Farm Chemicals
Taiga Consulting	Tote Road Access into Wedge and Weedy Lakes

Table 3 - Assessment Process Completed

Proponent	Project
Amok Ltd.	Claude Ore Body Uranium Mining Expansion
Regina, City of	Relocation of CN Mainline and Marshalling Yard
Saskatchewan Power Corporation	230 KV Transmission Line - Codette to Beatty

Table 4 - Projects Deferred or Cancelled

Proponent	Project
Saskatchewan Highways and Transportation	Highway #8 Relocation - Qu'Appelle Valley
Saskatchewan Highways and Transportation	Highway #55 Relocation - Green Lake
Saskatchewan Highways and Reloca-Transportation	Hanson Lake Road (Highway #106) Relocation - Big Sandy Lake Area

Environmental Protection Service

G.W. Howard, Executive Director

L.J. Lechner, Director
Air Pollution Control Branch

A.C. Schuster, Director
Land Protection Branch

R.R. Sentis, Director
Mines Pollution Control Branch

D.A. Fast, Director
Water Pollution Control Branch

Environmental Protection Service

Introduction

Protection of Saskatchewan's environment is a complex task and is the responsibility of all levels of government, industry and the public. Through four branches, the environmental protection service has the responsibility of:

- establishing environmental quality objectives;
- establishing emission or ambient standards;
- licensing treatment and pollution control works;
- enforcing standards;
- requiring improvements where necessary.

Legislation

The department is authorized to carry out the above responsibilities under The Department of the Environment Act, The Air Pollution Control Act, The Water Resources Management Act and The Litter Control Act.

Interagency Activities

The department works with several other departments to ensure the protection of the province's environment. Some examples include:

- Saskatchewan Agriculture regulates intensive livestock operations;
- Saskatchewan Energy & Mines regulates oil and gas development;
- Saskatchewan Health regulates landfill sites and cottage wastes and provides laboratory services. Public health inspectors inspect water and sewage treatment facilities and report their findings to Saskatchewan Environment for any required follow-up;
- Saskatchewan Urban Affairs provides grants for water and sewage works;
- Officers of Saskatchewan Parks and Renewable Resources make extensive use of The Litter Control Act.

Other Controls

The owner or operator of pollution control or water works is required to carry out monitoring programs and report findings to Saskatchewan Environment. Licences to operate pollution control works are issued for a fixed term of up to five years. This procedure enables a periodic review of the terms and conditions in the licence before the licence can be renewed.

Coordination

To ensure that a coordinated approach to environmental pollution concerns is maintained, the service holds regular meetings of its four branches. In addition, there is extensive contact with municipal government, federal government agencies and provincial agencies.

An example of a coordinated approach to environmental protection is found at the Poplar River power project. The executive director represents the province on the Poplar River Bilateral Committee with technical support from the Air Pollution, Water Pollution and Mines Pollution Control Branches, plus the Hydrology and Water Rights Branches of the Water Management Service.

Air Pollution Control Branch

- maintains a network of ambient air monitoring stations in urban centres;
- issues operating permits to industrial operations to ensure air pollution control standards are met;
- investigates air pollution complaints;
- conducts special studies on suspected problem areas;
- provides technical assistance and information on request;
- drafts guidelines to assist applicants in obtaining permits to operate;
- reviews development proposals and environmental impact studies received from the Coordination and Assessment Branches.

Air Management Division

Urban Air Monitoring Program

The provincial Urban Air Monitoring Program operated in all 12 Saskatchewan cities at the start of the fiscal year. In July of 1983 permanent monitoring was discontinued in Weyburn, Yorkton, Swift Current, North Battleford, Prince Albert and Melville. In the future, these cities will be monitored on a rotational basis using the branch's mobile air quality monitoring station. Other program changes included the addition of a sulphur dioxide monitor in Estevan, removal of a sulphur dioxide monitor from Moose Jaw, removal of one high volume sampler from Regina and the addition of new data aquisition equipment in Regina and Saskatoon.

Eight high volume air samplers collected data on suspended particulate levels in the province. The results obtained over the past 12 years indicate that particulate levels are generally decreasing or remaining constant. The annual provincial standard of 70 micrograms per cubic meter was not exceeded at any of the monitoring locations in 1983.

Four sulphur dioxide monitors collected data as part of the National Air Pollution Surveillance (NAPS) program in Saskatchewan. Sulphur dioxide levels in the major cities are very low. The provincial one hour standard of 17 parts per hundred million (450 micrograms per cubic meter) was not exceeded in any of the urban monitoring locations during 1983.

Table 5 - Urban Air Monitors in Saskatchewan Cities

	Present	Proposed
Regina	2 high volume samplers 1 sulphur dioxide monitor 1 carbon monoxide monitor 1 oxides of nitrogen monitor 1 ozone monitor	1 hydrocarbon monitor
Saskatoon	2 high volume samplers 1 sulphur dioxide monitor 1 carbon monoxide monitor 1 oxides of nitrogen monitor* 1 ozone monitor*	
Moose Jaw	1 high volume sampler	
Lloydminster	1 high volume sampler 1 sulphur dioxide monitor	
Estevan	1 high volume sampler 1 sulphur dioxide monitor	
Melfort	1 high volume sampler*	

* Provincial monitor - other monitors supplied by Environment Canada

In Saskatoon during 1982, the provincial one-hour standard for carbon monoxide of 13 parts per million (15 milligrams per cubic metre) was exceeded once. The eight hour standard of five parts per million (six milligrams per cubic metre) was exceeded 10 times. In Regina, the one hour standard was exceeded twice and the eight hour standard was exceeded 18 times. Automobile traffic is believed to be the major contributor to these readings.

An air quality index which summarizes annual monitoring results was calculated for Regina based on the available data. Individual indices were determined for ozone, suspended particulates, sulphur dioxide and carbon monoxide. These were averaged to give an overall annual index of 29, which means that the air quality in downtown Regina during 1983 can be described as fair. Suspended particulates make the largest contribution to the index primarily as a result of dust from roads and farming operations.

Reports summarizing the provincial air monitoring program in more detail are published annually and are available from the department on request.

In addition to the NAPS program, the branch operated a mobile air quality station, monitored air quality in the vicinity of various industrial operations, and required a number of licenced operations to carry out air monitoring as a condition of approval.

Permit System

The Air Pollution Control Regulations, which became effective in 1975, outline the provincial air quality standards and the requirements for an industrial permit system. New industrial sources of air pollution require permits from the branch. Existing operations do not require permits unless requested by the Minister of Environment or unless a significant expansion program is undertaken.

During the fiscal year, 31 new permits were issued and 120 permits were renewed.

Table 6 - Classification of Permits

	New	Renewals	Cancelled
Anhydrous Ammonia Storage Facilities*	—	—	27
Asphalt Plants	3	32	6
Bulk Anhydrous Ammonia Facilities	—	2	—
Grain Elevators	21	33	—
Heavy Oil Gathering and Treating Facilities	2	6	—
Herbicide Formulation Plants	—	1	—
Incinerators	1	3	1
Iron Foundries	—	3	—
Oil Refineries	—	1	—
Post Treatment Plants	—	2	—
Seed Cleaning Plants	1	6	—
Steel Mills	—	1	—
Thermal Generating Stations	—	1	—
Wood Products	—	3	—
Miscellaneous Industries	3	26	1
Total	31	120	35

* Regulation of these facilities transferred to Department of Labour

Industrial Monitoring Activities

Avonlea Mineral Industries Limited, Wilcox

The company is monitoring suspended particulate levels and dustfall near the plant. The results obtained are typical of a small town located in an agricultural area. Company monitoring will continue as a result of an operating permit issued by the Air Pollution Control Branch.

Federated Co-operatives Limited, Regina

Additional odour complaints were received during the fiscal year as a result of refinery operations. At year end the sulphur recovery plant was in place but not yet in operation. Improvements in the waste water lagoon system are planned which should reduce the odour potential in this area.

With the announcement of a heavy oil upgrader at the refinery, the branch will carry out additional monitoring on a short term basis to determine the impact of existing operations on the Uplands subdivision.

Pasqua Paving Limited, Regina

Improvements in the operation were made in the fiscal year. A permit to operate will be issued for 1984/85.

IPSCO Inc., Regina

IPSCO experienced problems with the air pollution control equipment installed on furnace #5. As a result of the record high production rates achieved by the furnace the amount of dust generated has increased significantly. The control equipment cannot effectively handle the dust load and consequently, emissions have frequently bypassed the system and entered the atmosphere through the furnace roof vent.

IPSCO is proposing to replace the existing control equipment during the next fiscal year.

Poplar River Power Station, Coronach

The Saskatchewan Power Corporation conducted ambient monitoring for suspended particulates and sulphur dioxide in the Town of Coronach. Monitoring results showed that the plant had a small impact on the levels of these pollutants in the area. Air monitoring data was exchanged with U.S. authorities.

Murphy Oil Ltd., Eyehill Thermal Project, Macklin

The hydrogen sulphide incinerator previously installed by the company operated satisfactorily during the year. However, some H_2S episodes have subsequently been detected by the company's monitoring equipment and primary production wells in the area suspected of causing these episodes. The company is investigating other H_2S sources in the area.

Armak Chemicals, Saskatoon

The branch received a complaint early in the year concerning objectionable odours and garden plant damage as a result of emissions from Armak's plant on Warman road north of Saskatoon. The company has plans to install an odour control incinerator at the facility during the next fiscal year.

Complaint Investigation

Fifty-eight air pollution and noise complaints were received during the fiscal year. In general, the complaints centered on dust and odours from operations such as asphalt plants, oil refineries, grain elevators and construction projects. In a number of cases small changes to the operation, additional precautions, or changes to operating procedures were or would be sufficient to satisfy the complaint. On the whole, Saskatchewan industries and citizens cooperate with department requests to eliminate the cause of air pollution complaints. Of the 58 complaints, nine were resolved during the year, five did not require further action by the branch, 11 were still under investigation at the end of the reporting period and 20 require further action by industry to correct the problem.

Special Studies

Ambient Air Monitoring - Heavy Oil Projects

The branch's ambient air monitoring program near tertiary heavy oil pilot projects ended during the year. Monitoring was carried out at the Mobil GC project south of Lloydminster, at the Husky Golden Lake project north of Maidstone and at the Murphy Oil Eyehill project north of Macklin. Data summaries are available from the Air Pollution Control Branch upon request.

Urban Air Monitoring

During the next fiscal year an ambient air monitoring program will be established in the smaller cities across the province. On a rotation basis of approximately six months in duration, cities such as Moose Jaw, Prince Albert, Estevan and Weyburn will be monitored for a range of air pollutants. This program replaces the high volume air samplers previously operated in these centres and will provide a much better picture of overall air quality than previously available.

Acid Rain

Saskatchewan Environment is a member of the Long Range Transport of Atmospheric Pollutants Technical Committee which plans and coordinates acid deposition research and monitoring programs for western Canada. An annual report outlining the acid rain activities in western Canada during 1983 will be available in the next fiscal year.

A second snowpack chemistry survey of small lakes in northern Saskatchewan was conducted in March 1983. This survey also collected lake water samples. A report on this survey is expected in the next fiscal year.

A rainfall sampling program in northern Saskatchewan, initiated in 1982, was continued in 1983. Samples of rain events were collected and analyzed from five sites. The levels of sulphate and nitrate (indicators of acid deposition) in the rain were quite low. Further monitoring will be carried out in 1984.

Preliminary maps of Saskatchewan depicting soils and geology sensitivity to acid precipitation were completed in March, 1983. Discussions will be held with Alberta and Manitoba to ensure continuity at the borders before the maps are finalized. A similar project is underway to produce lake sensitivity maps for the province. It is expected that these maps will be completed in the next fiscal year.

Legislation

Air Pollution Control Act and Regulations

A review of The Air Pollution Control Act and Regulations were undertaken and a number of areas requiring updating and modification were identified. Additional ambient air quality standards will be included in the new draft, and changes will be made to the permit system to bring major existing industries under the approval process. Work has begun on drafting the legislation with an expected completion date of fall 1985.

Land Protection Branch

- develops and administers hazardous waste management programs;
- administers the Environmental Spill Control Regulations;
- cooperates with other departments in investigating and promoting opportunities for recycling waste materials;
- adminsters the Pesticide Container Disposal Program;
- offers technical assistance to other departments in evaluating proposed waste disposal activities;
- administers The Litter Control Act and Regulations pertaining to beverage containers;
- administers the Reservoir Development Area Regulations;
- develops and administers, in cooperation with other departments, shoreland management policies and programs;
- develops and administers management programs for urban areas subject to severe flooding.

Waste Management Division

Spill Response and Control

Saskatchewan Environment is responsible for the enforcement of the Environmental Spill Control Regulations which are designed to safeguard the environment in the event of a spill. The regulations require that spills of pollutants be reported immediately to the department's Spill Report Centre to ensure proper containment, clean-up and disposal of contaminated material.

The Centre offers around the clock service by providing assistance in determining proper containment or control action required to protect public health, property and the environment. Advice is also given in designing proper remedial action to ensure long-term environmental protection. The Centre also serves as liaison between other agencies that might be affected by a spill event.

During the year, the Spill Report Centre received over 1,000 calls. 219 of these were to report spills under the Environmental Spill Control Regulations. In addition, the Spill Response Team dealt with numerous complaints and requests for information concerning chemical handling and disposal. Staff assisted with an additional 50 reported incidents where there were hazardous substances involved but no discharge into the environment, or where the volume of spilled material was below the reportable limit.

There were over 100 visits made to spill sites to investigate, inspect and supervise remedial measures. Dozens of additional inspections were completed with the assistance of other provincial or municipal officials and emergency response organizations such as fire departments.

Table 7 summarizes the number of spills reported, the product, and the total volume spilled. Similar to past years' statistics, petroleum products account for more than 50 per cent of the total spills. A further breakdown of this category is shown on Table 8.

Other spilled materials classified as non-petroleum products include agricultural chemicals, acids and bases, uranium mine process or waste water and other organic or inorganic chemicals.

More than a dozen technical studies and investigations were completed for the department or for companies responsible for spills by various consulting firms. These investigations were required as the result of spills. Remedial measures were undertaken to prevent or minimize the contamination of ground water or other potential risks.

Training is an ongoing activity for the department's spill response team members. A ground water workshop was held in January, 1984 for the spill team members and other department personnel to upgrade their knowledge of ground water protection and other related matters.

Spills at Uranium Mines Sites

A total of 28 spills from the three operating uranium mines were reported. 17 spills involved uranium mine process water, contaminated waste water or other radioactive waste. The spills at the mine sites were caused by line leaks, overfilling tanks, mishandling or equipment failure. Following the spill of radioactive material, a gamma survey is carried out before and after the clean up to ensure that the remedial action is complete. The Mines Pollution Control Branch staff inspected all of the spill areas during their visits to the mines.

The spill of 87 million litres of contaminated water at Key Lake Uranium Mine due to overtopping of a reservoir focused a great deal of attention on the other activities at the mine. Investigations to determine the cause of the spill and the potential environmental impact were conducted. Following the completion of those investigations, the Minister ordered the company

to implement a clean-up and monitoring program and to revise its spill control contingency plan.

Spills at Petroleum Products Installations

There were 42 reported incidents involving leaking storage tanks or line leaks at various petroleum product installations. Most of these cases were detected from shortage in inventory and other irregularities in the fuel system. In some cases, these leaks had gone on for some time and resulted in the detection of fuel or its vapor in nearby wells, buildings or sewage systems resulting in considerable risk to health and property as well as the environment. One such incident, where aviation fuel was detected in a well at the La Ronge Airport, resulted in the excavation of contaminated soils and the installation of a fuel recovery system. Another incident occurred at the Town of Beechy resulting in an extensive investigation conducted by department staff and the company's consultant. A specially designed trench recovery system was constructed which has allowed for the recovery of over 15,000 litres of fuel by year end.

PCB Spill at Federal Pioneer Limited (FPL), Regina

Site surveillance and the monitoring program, directed by the department to contain the polychlorinated biphenyls (PCBs) spill at FPL's Regina plant, continued over the past year. The results indicated that the dewatering program has not been as effective as anticipated and there is indication of the downward movement of PCBs into the upper layer of the Condie silt. Although these findings do not constitute an immediate danger to the Regina aquifer, some extensive mitigative measures will be undertaken by FPL in 1984 and the monitoring program will continue.

Agriculture Chemical Spills

Incidents involving agricultural chemicals increased from 7 last year to 19 during this year. Agricultural chemicals spilled include anhydrous ammonia, fertilizer and pest control products. A fire at a seed cleaning plant in the Village of White Fox resulted in the evacuation of dozens of residents and totally destroyed the plant. Several hundred litres of farm chemicals as well as 1800 kg of strychnine based gopher poison were involved. The department provided technical assistance to the village and the company respecting chemical safety, clean-up and the disposal of contaminated materials.

Table 7 - Spill Statistics by Product, Number of Incidents and Quantity

Products Spilled	Number of Incidents	Volume Spilled (m^3)
1. Petroleum Products		
(a) Gasoline	40	103
(b) Diesel and heating fuel	47	210
(c) Asphalt/crude oil	18	80
(d) Used Oil	8	2
(e) Others	9	28
Subtotal	122	423
2. Non-Petroleum Products		
(a) Agricultural chemicals	19	79
(b) Acids/bases	9	29
(c) Uranium mine contaminated water	17	101,203
(d) Other organic/inorganic substances	40	5,583
(e) Waste products	10	3,480
(f) Miscellaneous	2	1
Subtotal	97	110,874
TOTAL	219	111,297

Table 8 - Petroleum Product Spill Statistics by Cause, Number of Incidents and Quantity

Cause of Spill	Number	Volume Spilled (m^3)
Above ground tank leak	4	18
Below ground tank leak*	14	24
Tank overflow	16	51
Transportation incident	15	57
Equipment failure	19	80
Line leak*	24	98
Others/unknown	30	95
TOTAL	122	423

* Volume of products spilled from these incidents are difficult to estimate. Actual volume spilled could be significantly higher.

Hazardous Wastes

During this fiscal year amendments were made to The Department of the Environment Act (June, 1983) which define hazardous waste and substances and allow for the enactment of regulations pertaining to the storage, treatment, transport and disposal of these materials. In addition, the department continued its investigation into historical and ongoing practices of waste management in the province.

A consultant's report in the spring of 1983 identified 97 active or abandoned landfills within the province as having the potential to cause serious environmental impact. In response to this report field investigations were carried out at over half of these sites to further assess the concerns. A detailed geotechnical study was also conducted at an abandoned industrial site. Further investigations and assessments are planned together with mitigative action, where required, during the next fiscal year.

The department continued to provide technical information and assistance to the public, industry and other government departments on proper disposal of toxic chemicals and development of contingency plans for storage and treatment facilities.

In cooperation with the Cities of Regina, Saskatoon, Prince Albert, Lloydminster, Moose Jaw and Estevan the department reviewed and provided technical comments on comprehensive site investigation studies and proposals. The department approved and monitored a pilot project for the treatment of oil contaminated with PCBs. The technology involved the chemical reaction of the contaminated oil with a sodium based reagent. The byproducts from the process consisted of oil, capable of being re-refined by conventional technologies, and innocuous sludge. The department is pleased with the development of this technology and feels that it will assist Saskatchewan industry in dealing with an otherwise hazardous waste.

Pesticide Container Disposal Program

There are approximately one million pesticide containers sold annually in the province. Approximately 70 per cent of the total containers are metal; the remainder are primarily plastic. Surveys conducted by the Saskatchewan Safety Council in 1981 and 1982 showed that a large number of these containers were not disposed of appropriately.

In response to numerous requests from the concerned groups, the Pesticide Container Disposal Program was initiated in the spring of 1983. Approximately 70 per cent of rural municipalities took advantage of the program during the first year with the establishment of 170 sites. In a number of cases, urban and rural municipalities joined forces to provide appropriate and accessible sites. Support and encouragement for the program was received from the Saskatchewan Association of Rural Municipalities and Saskatchewan Urban Municipalities Association.

In its initial year of operation over 250,000 containers were crushed and over 60 barrels of residue collected for proper disposal.

A contract has been awarded for the 1984 program which provides for the removal and recycling of the crushed metal containers and the collection and disposal of associated residue.

Municipal Waste Disposal

During the year the department continued to provide technical advice to municipalities on the establishment of waste disposal areas. Applications for 54 liquid domestic waste haulers and 28 landfill sites, submitted by the Department of Health, were reviewed.

The department continued to provide advice to the Department of Energy and Mines on disposal practices with respect to waste from the oil production industry.

Beverage Containers

The number of complaints handled about the failure by vendors to comply with bottle refund regulations increased from 12 to 19 over the last year.

Land Management Division

Floodplain Management Program

General Investigations and Policy Development

This division provides information on floodplain management to provincial agencies, municipalities and private interests. Good floodplain management is essentially a matter of reducing potential flood damage.

During the year, 42 subdivision proposals from urban centres were reviewed under the program to assess the degree of flood risk, the impacts of the land uses and the feasibility of using floodproofing techniques. Technical comments were provided on four proposed bridge designs and floodproofing guidelines were provided for nine development projects. Two zoning bylaws were also reviewed and the comments made provided the basis for the floodplain management section of the bylaws.

The development of a provincial water resource management data base, necessary for floodplain management, continued to be a major activity of the division. Work also continued in 1983-84 on a draft model zoning bylaw to be used by zoning authorities in directing floodplain management. Further techniques of floodproofing new and existing developments from flood damage were researched during the year.

A significant part of the division's effort continued to be devoted to floodplain management policy development. Six policy development projects were undertaken during the year, covering such areas as the use of dykes as floodproofing; the treatment of low lying areas located behind dykes; floodproofing assistance; floodprone property acquisition/relocation assistance; and flood risk disclosure. A review of the design flood frequency for communities located on rivers and streams was also completed.

The division initiated work on policy application by undertaking a case study of floodplain management in Weyburn. The study developed alternative comprehensive floodplain management strategies based on the flood control analyses done for Weyburn over the past decade, and the policy development work described above. At year end the study report was under review by the department and other provincial agencies that have an interest in floodplain management. This study will form the basis for an action plan to be discussed with Weyburn and the federal government.

Canada-Saskatchewan Flood Damage Reduction Program (FDRP)

In April, 1977, two flood damage reduction agreements were signed between Saskatchewan Environment and Environment Canada. One agreement outlined the broad goal of the two governments, which is to reduce damage in flood hazard areas through better floodplain management. The second, a five year $1.7 million cost-shared mapping and studies agreement, provided for the completion of studies, maps and designation of flood hazard areas.

Committees were established under both agreements. The division is represented on the steering and technical committees and acts as the program coordinator for the work undertaken under the mapping and studies subagreement.

Since the expiry of the mapping and studies agreement in April, 1983, technical work has been

limited to completing studies begun before the expiry and to undertaking new studies as approved by the Federal-Provincial Steering Committee. One major project initiated in 1983-84, the Lumsden Floodplain Management Study, was completed. Several other longer-term studies, primarily of a technical nature were also completed during the fiscal year. Table 9 shows the year-end status of the technical work under the mapping and studies program.

Table 9 - Mapping and Studies Program Status

Community	Air Photos and Ground Survey	Base Mapping	Hydrology Study	Hydraulic Study	Planning Study	Information Map
Battlefords	Complete	Complete	Complete			
Beauval*	—	—	—	—	—	—
Big River*	—	—	—	—	—	—
Buffalo Narrows	Complete	Complete				
Carrot River	Complete	Complete	Complete			
Craven	Complete	Complete	Under way	Under way	N/A	
Eastend	Complete	Complete	Complete	Complete	Complete	
Estevan	Complete	Complete	Complete			
Fort Qu'Appelle	Complete	Complete	Under way			
Gravelbourg	Complete		Complete			
Green Lake	Complete	Complete				
Hodgeville	Complete	Complete	Complete		N/A	
Ile-a-la-Crosse	Complete	Complete				
Kamsack	Complete	Complete	Complete			
La Ronge	Complete	Complete	Complete	Complete		
Lebret	Complete	Complete	Complete	Under way		
Lumsden	Complete	Complete	Under way	Complete	Complete	
Melfort	Complete	Complete	Complete	Complete	N/A	On hold
Moose Jaw	Complete	Complete	Complete	Complete	Complete	Complete
Oxbow	Complete	Complete	Complete			
Prince Albert	Complete	Complete	Complete	Complete		
Radville	Complete	Complete	Complete			
Regina	Complete	Complete	Complete	Complete		
Roche Percee	Complete	Complete	Complete			
Saskatoon	Complete	Complete	Complete	Complete		
Swift Current	Complete	Complete	Complete	Complete	Complete	On hold
Tantallon	Complete	Complete	Under way	Complete		
Tisdale	Complete	Complete	Complete			
Val Marie	Complete	Complete	Complete		N/A	
Weyburn	Complete	Complete	Complete	Complete	Under way	On hold
Yorkton*	Complete	Complete				

N/A - No planning study anticipated for this community.

* Is being added to the program — to be delated from program.

Shoreland Management Program

Reservoir Development Areas

A Reservoir Development Area is an area of land surrounding a reservoir and designated as such to ensure orderly development and land use around it, and to accommodate the various uses of a reservoir such as power generation, recreation, public uses, cottages or institutional camps.

Revisions to The Water Resources Management Act were drafted to update the Reservoir Development Area Regulations, 1976, and the Recrsation (Residential) District Building Regulations, 1969.

To date, seven designated provincial reservoir development areas, containing 5,700 square kilometres have been established. These are Lake Diefenbaker, Blackstrap, Brightwater, Bradwell, Zelma, Dellwood and Avonlea.

During the year, the branch issued four development permits at Lake Diefenbaker. Out of four permits issued, three were for recreational purposes and one for agricultural use.

Division staff provided technical and professional advice to anyone considering development around waterbodies, whether or not the development was within a reservoir development area.

All municipal offices within the reservoir development areas were visited during the year to make sure local officials were familiar with the reservoir development area concept and objectives. These visits allowed for informal discussions of the regulations, identification of problems in the development area and discussion of local concerns.

Contacts with cottage owners' associations and muncipalities to implement and update building standards and zoning bylaws for cottage areas within reservoir development areas were undertaken during the fiscal year.

Early in the year meetings and discussions were held with Saskatchewan Power Corporation, interested government departments, and the Rural Municipalities of Nipawin and Torch River regarding the establishment of a reservoir development area around the new SPC reservoir and hydroelectric generating station near Nipawin. Contact was also made with the R.M. of Hart Butte regarding the establishment of a reservoir development area around Cookson Reservoir.

Subdivision Proposals

Subdivision proposals throughout the province are examined by the division to ensure that development proposals are not subject to soil instability, flooding, or other hazards. These problems are of particular concern to land developments located on hillsides or close to waterbodies.

During the fiscal year, 65 shoreland subdivision proposals, 99 country residential subdivision proposals, 43 commercial/industrial proposals, 29 proposals for municipal purposes and 30 other proposals for various purposes were reviewed by division staff. These 266 proposals provided for the creation of 2861 lots.

These proposals were referred to the branch by Saskatchewan Urban Affairs, Saskatchewan Rural Development and Northern Saskatchewan. After reviewing their environmental suitability and possible impact on other nearby uses, the branch provided comments and guidelines to the referring departments.

Studies

Studies begun in 1982-83 regarding shoreline conditions, materials, erosion and slumping potential, and recreational and institutional land use potential for both Cookson and Codette Reservoirs were completed and made available for technical use during 1983-84. In addition, a study was completed to develop and test subdivision review techniques.

Investigations

Investigations carried out on reported shoreland problems included the dumping of debris into lakebeds and rivers, overcrowding in shoreland areas (particularly around smaller lakes), boating conflicts, public access along the water's edge and assessing physical hazards at specific sites.

Mines Pollution Control Branch

- administers a program to control the environmental effects of all mining development through licensing, monitoring, and inspections;
- inspects operations and conducts monitoring of effluents and receiving waters at mine sites;
- evaluates the technical aspects of the design and construction of solid and liquid waste management systems and air pollution control facilities at mine sites;
- administers a program to protect the public from unusually high levels of naturally occuring radiation.

Mines Division

The division is responsible for licensing, monitoring and inspecting all uranium mining operations in the province. Staff visit the sites to perform inspections and take samples in and around the operations. Approvals to construct and to operate the facilities are administered by the branch. In addition, companies are required to monitor all aspects of the environment on a regular basis and submit the data to the division. This monitoring data resulted in more than 20,000 separate water quality analyses being performed. The public has access to all licenses issued and the monitoring data.

Branch staff conducted 45 on-site inspections of the uranium mining facilities. Over 90 water quality samples were taken during these inspections, accumulating nearly 3,600 analyses. In addition, 73½ person days were spent on site by branch staff monitoring the January 5 spill at Reservoir #2 at Key Lake and the resultant clean-up. While on site, an additional 138 water quality samples were taken requiring 1,270 separate analyses. Key Lake Mining Corporation had also performed approximately 2,000 additional analyses until March 31/84 monitoring the possible effects of the spill.

Key Lake Mining Corporation, Key Lake

Construction and development of the KLMC Mining and Milling Facilities continued during the spring and summer of 1983. Start-up of the milling process began in late fall with the first drum of yellowcake being produced on October 20, 1983.

Problems were encountered during the start-up of the operational phase of the KLMC facility which resulted in a number of plant modifications and operational changes to improve the operating performance of the mining and milling activities.

A major spill occurred on January 5, 1984, which resulted in approximately 87,000 m^3 of minewater being released to the environment. Clean-up and monitoring of the spill continued until the end of March. During the course of the clean-up, the department utilized three separate consultants to identify and recommend corrective actions and clean-up options.

Construction activities for the development of the Deilmann ore body consisted of installing a series of 13 peripheral groundwater dewatering wells in the vicinity of the north-west section of the ore body. The Phase I dewatering wells began operation during the middle of December and are the begining of a network of dewatering wells to be installed around the perimeter of the orebody to lower the groundwater table below the orebody.

Amok, Cluff Lake

Development work at the Cluff Lake site continued as Amok further modified the milling process for Phase II. Approval to proceed on this second phase was granted under the Environmental Assessment Act on June 9, 1983. Full mill start-up of the Phase II operation is scheduled for August, 1984. Amok has been stockpiling the lower grade ores from the open pit at Claude and the underground working at OP Zone. Reprocessing of lower grade ore removed during the Phase I gravimetric milling process will also be undertaken during Phase II.

Research and discussions into the long term disposal technique for the leach tailings also continued this year. Decommissioning strategies for the mined out D Pit and the present tailings management area were being reviewed by the regulatory agencies as well.

Eldor Mines, Rabbit Lake/Collins Bay

The original Rabbit Lake pit was mined out near the end of March, 1984. Uranium ore from that pit will be used as mill feed until approximately September, 1985 when the new Collins B Zone ore will be phased in. Construction of the Collins B steel-celled dyke was completed by mid March. Completion of the main buttress for the dyke and beginning the overburden removal for the Collins B Zone is scheduled for the summer of 1984.

Other construction activities around this site in 1983-84 included Collins B mine water line placement and containment ditch construction, tailings filtration plant, sedimentation pond, a new haul road to Collins Bay and a new generator building.

Eldorado Resources Limited, Beaverlodge

Eldorado Resources Limited's Beaverlodge operation located near Uranium City is continuing the reclamation and decommissioning on the closeout of the uranium mining, tailings deposition and treatment areas, as well as the milling complex. Under joint agreement with other provincial and federal agencies, ongoing approval of the adopted decommissioning strategy continued. Criteria established with these agencies toward a permanent closeout have been adhered to by ERL. Approximately 33 ERL employees remained on site during this stage of decommissioning. Completion is scheduled for June, 1985, with an interim monitoring period of 5 to 10 years being negotiated at year end.

Potash Mine Operations

During the fiscal year, all potash mines in the province were licensed under the Department of the Environment Act.

Coal Mine Operations

During the fiscal year the coal mine licensing program was completed. There were five licensed coal operations in the province at the end of the report period.

Radiation Division

Natural Radiation

Uranium is naturally present in most Saskatchewan soils. To prevent a situation similar to that of Uranium City, the division began a province-wide study to identify other areas where the possibility of natural background levels of radiation in the soil are high. The study is expected to take several years to complete.

The first phase of the study was conducted in 16 non-mining northern Saskatchewan communities during the summer and fall. A summary report for public information was released in 1981.

The second phase of the study involved a survey of communities in the southeast portion of the province. A report on this work is presently being prepared.

Interagency Activities

All aspects of uranium exploration and development which involve over 10 kilograms of uranium require licensing by the Atomic Energy Control Board (AECB). The AECB is concerned primarily with control of uranium from the ore body through its intended use and also with any radioactive waste disposal. The Mines Pollution Control Branch works closely with the board to ensure there is no conflict of objectives and to minimize overlap in the control.

The Department of Northern Saskatchewan was, and the Northern Affairs Secretariat is responsible for negotiating and issuing surface lease agreements to companies developing uranium resources. The branch works closely with the department in developing and implementing sections dealing with environmental and abandonment concerns. Three agencies, the Atomic Energy Control Board, the federal Ministry of Transport, and Saskatchewan Environment are involved with the transportation of hazardous substances. The Mines Pollution Control Branch assists with inspections and remedial actions for spills of materials to and from mining operations.

National Uranium Tailings Program

The National Uranium Tailings Program of the federal Department of Energy, Mines and Resources was initiated in 1983. The five year intensive research program into the long-term management of uranium tailings consists of three components: disposal technology, modelling, and measurement.

The objective of the program is to provide a scientifically credible information base that will assist government regulatory agencies in making decisions with a degree of confidence, and in establishing criteria for the long-term protection of man and his environment.

Saskatchewan Environment provides representatives to the Senior Advisory Review Board and the Technical Advisory Committee. The purpose of the Technical Advisory Committee is to provide technical advice and assistance to the Department of Energy, Mines and Resources on research projects from start to finish.

The National Uranium Tailings Program has initiated planning and alloted funds for uranium tails research at Gunnar and Key Lake.

Water Pollution Control Branch

- manages water quality and controls pollution through programs of approvals, inspections, and technical assistance for water and sewage works;
- maintains surveillance of provincial water;
- coordinates collection of samples of surface water, sediments and effluents and interprets data on natural water quality and on raw and treated waters and wastewaters;
- upgrades the skills of operators of municipal water and sewage works and develops and administers a system of voluntary certification;
- establishes quality objectives, sets design and operational guidelines for water and sewage works and recommends conditions for their operation;
- controls pollution through a program of approvals and inspections for industrial wastewater treatment works;
- issues permits and provides advice for aquatic nuisance control;
- investigates complaints about water pollution and recommends improvements;
- assesses water quality components of environmental impact studies and provides water quality advice.

Objectives, Standards and Approvals Division

Municipal Approvals

During the fiscal year eleven new water and sewage works became operational. The branch issued new operating approvals to 3 water works and 7 sewage works and renewed 470 municipal operating approvals. At the year end, there were 423 water works and 425 sewage works in operation. In addition 397 construction approvals were issued for the construction, alteration or extension of water and sewage facilities. Construction costs for the facilities were approximately $29 million. The branch also issued approvals for a number of private water and sewage works.

Industrial Approvals and Inspection

Industrial operations that discharge wastes directly into receiving waters must obtain approvals to construct and operate treatment works under the Water Pollution Control Regulations.

During the report year, approvals to construct pollution control works were issued to Boundary Dam Power Station, CSP Foods Ltd. and the Estevan Generating Station. 14 approvals to operate pollution control works were issued to ARMAK, Saskatoon Chemicals, Saskatchewan Power Corporation Boundary Dam, IPSCO, CSP Foods, Prince Albert Pulp Mill, Saskatchewan Power Corporation Poplar River Power Plant, Fresh Water Fish Marketing, Saskatchewan Power Corporation Queen Elizabeth Power Plant, CGTX, Saskatchewan Forest Products, Saskatchewan Power Corporation Estevan Power Plant, and Kleyson's Transport.

Branch staff made 37 visits to the industries to inspect pollution control systems or to hold special meetings.

Prince Albert Pulp Company Ltd., Pulp Mill

The quality of wastewater discharged from the pulp mill was consistent with past years. There were 12 biochemical oxygen demand excursions during the fiscal year, but no excursions on total suspended solids.

Saskatoon Chemicals

The quality of effluent discharged by Saskatoon Chemicals was generally satisfactory with one mercury, three residual chlorine and three chromium, two alkalimitz and one sodium and one chloride excursions of the discharge limits.

ARMAK Chemicals Ltd., Saskatoon

The chemical oxygen demand increased by 30 per cent over the previous five year average to 438 kg/day. Ammonia nitrogen loadings decreased compared to the previous year. There were three ammonia nitrogen and nine nickel loading excursions in the fiscal year, and pH control continued to be a problem.

CSP Foods, Nipawin

The oil seed crushing and refining operation near Nipawin continued to produce crude and refined edible oil products. The company had 29 pH excursions, but no other solubles excursions.

SPC Poplar River Power Plant

Boron and total dissolved solids in the East Poplar River were below the long-term and short-term objectives recommended to the respective Governments by the International Joint Commission (IJC). There were no discernible

trends from pre-project conditions. Water quality was acceptable, based on the objectives recommended by the International Poplar River Quality Board to the IJC. The rate of ground water seepage from the ash lagoon was computed to be within the established standards for the Poplar River plant.

Surface Water Quality Monitoring

Water quality trends of Saskatchewan surface waters were continuously monitored. During the fiscal year 1347 water samples were collected and 28,937 analyses performed.

A summary of activities is shown in Table 10. Table 11 summarizes the water quality in the Qu'Appelle basin.

Data Handling

During the report year, work was finalized on a computer based data handling system called Biodat. This system was designed to store and retrieve biological data accumulated by the branch and through information provided by other agencies.

This system has been integrated with the chemical water quality data stored on Esquadat, first implemented in 1978.

Table 10 - Water Quality Sampling Statistics

Type of Sample		Samples	Average Number of Analyses Per Sample	Analyses Per Location for Year
Surface Water (basin)	Qu'Appelle	139	24	3,286
	North Saskatchewan	54	29	1,580
	South Saskatchewan	129	25	3,168
	Saskatchewan	18	40	788
	Souris	21	39	812
	Missouri	5	48	240
	Northern Contract	14	40	560
	Other	25	10	50
Municipal	Water-chemical	32	7	224
	Bacteriological	11,434	1	411,434
	Sewage	93	14	1,302
	Free analysis	203	16	3,248
Industrial (company samples)	Papco, Prince Albert	321	15	4,908
	Saskatoon Chemicals	523	7	3,749
	Armak, Saskatoon	382	4	1,450
	CSP Foods	361	5	1,950
	SPC Boundary	110	6	660
	SPC Poplar	1,068	8	8,352
	SPC Queen Elizabeth	25	N/A	550
	Other	327	N/A	1,272
Industrial (department sampling)	Papco, Prince Albert	19	24	456
	Saskatoon Chemicals	9	25	225
	ARMAK	9	27	243
	CSP Foods	5	26	130
	Other	28	N/A	1,064
Special Studies	Intensive studies	259	27	7,120
	MS Mercury Control Project	53	7	384
	Spring Runoff	40	16	640
	Complaints	65	4	270
	Sediments	50	2	100
	Plankton	84	1	84
	Quality control	99	25	2,475
	Miscellaneous	48	14	672

I Churchill River and Lake Athabasca basins N/A - Not Applicable.

Table 11 - Waterbodies in the Qu'Appelle Basin - range of concentration

	Dissolved Oxygen		5 Day BOD*		Volatile Suspended Solids		Total Phosphorous As P		Total Kjeldahl Nitrogen	
Lake	May-Oct.	Jan.-Mar.	May-Oct.	Jan.-Mar.	May-Oct.	Jan.-Mar.	May-Oct.	Jan.-Mar.	May-Oct.	Jan.-Mar.
Buffalo Pound	2.8-18.4	2.4-17.4	1.2-6.0	1.4-3.8	4.0-8.0	1.1-400	0.10-0.15	0.06-0.2	0.9-1.5	0.9-1.3
Pasqua	0.15-6.9	—	2.0-3.0	—	4.0-7.0	—	0.19-0.45	—	1.5-1.9	—
Echo	0.35-8.1	—	2.8-3.6	—	4.0-9.0	—	0.28-0.54	—	1.3-3.0	—
Mission	4.5-7.6	—	2.0-5.0	—	2.0-7.0	—	0.60	—	1.8-1.9	—
Katepwa	0.3-9.6	—	4.0-5.0	—	3.0-5.0	—	0.31-0.56	—	1.4-2.4	—
Crooked	0.7-13.0	—	1.2-2.6	—	2.0-4.0	—	0.20-0.46	—	1.1-2.1	—
Round	1.3-17.5	—	2.0-5.5	—	3.0-7.0	—	0.18-0.25	—	1.5-2.6	—

* BOD biochemical oxygen/demand.
Ranges given in milligrams per litre.

Interagency Activities

Intensive Livestock Operations

Under the Pollution (by Livestock) Control Act, intensive livestock operations must receive prior approval for pollution control measures from Saskatchewan Environment before permits can be issued by Saskatchewan Agriculture.

During the report year 123 applications were reviewed and 113 approved.

Biocide Regulation and Research

The branch issued 40 approvals for the application of biocides to public surface water primarily for control of algae and other plant growth. 67 approvals were given for use of 16 other chemicals or mixtures for special applications.

Monitoring, Inspections and Technical Assistance Division

Municipal

Inspections

A total of 150 visits to 139 municipalities were made by branch staff to inspect water and sewage works or provide technical assistance.

Free Analyses Program

The branch continued to provide two free municipal sewage effluent analyses to Saskatchewan communities. The analyses are

done by the provincial laboratories in Regina.

The program was initiated to help monitor sewage treatment facilities and various effluent qualities. The service was used by 161 communities operating sewage works.

Operator Training

The Operator Training and Certification Committee is comprised of three operators from various areas of the province.

At the end of the fiscal year there were 229 certified operators for water and sewage works under the voluntary operator certification program.

Operators are classified at the same level as the facility they operate. All municipal water and wastewater facilities have now been classified according to the accepted formula based on unit process complexity, population served and relative water production of wastewater flow.

During the past year, 18 training sessions for plant operators were held throughout the province, with total attendance of nearly 400. One of the topics of the training sessions was iron and manganese removal at water treatment plants. There are about 300 treatment plants with iron and manganese removal facilities in the province.

The branch administered the Western Canada Water and Sewage Correspondence Course for operators of municipal surface water treatment plants. 17 operators were active in the course.

Projects

Spring Runoff

There was normal to below normal precipitation throughout the 1982-83 winter. 18 municipal discharges, 4 industrial effluents, Moose Jaw/Thunder Creek and general source waters were investigated during the monitoring program for spring runoff.

Data Requests

The branch responds on an ongoing basis to requests for information and/or data. A total of 84 requests from consultants, individuals or other government agencies were handled.

Water Conservation

A booklet titled "Water Conservation-Municipal Guide" was prepared and distributed to communities for promoting water conservation. Fact sheets titled "Make Every Drop Count" were prepared for distribution by participating communities to their water consumers.

Computer Capabilities

A review of the Branch's computer capabilities was undertaken during the fiscal year. Systems for computerizing municipal water and sewage information are under investigation.

Sludge Disposal Guidelines

During the report period, sludge application guidelines were being developed to provide for the agricultural usage of municipal wastewater treatment sludges.

Wascana Creek Water Quality

During 1982-83, extensive bacteriological monitoring of Wascana Creek and the Qu'Appelle River in the Lumsden/Craven area was initiated. The monitoring continued in 1983-84 to further assess the water quality and to determine the potential sources of causes for periodically observed elevated bacteria levels.

A report on the study was being prepared at year end.

North Saskatchewan River - Prince Albert Area

A water quality study of the North Saskatchewan River was conducted in 1982-83 and a report on the findings was being compiled at the end of the 1983-84 fiscal year. A subsequent intensive water quality study was conducted in the fall of 1983 in the Prince Albert area to better determine the local impact of effluents on the river. A report on the findings of the study will be available during the next fiscal year.

Mercury in Fish in Saskatchewan Waters

The branch continued to participate in an interdepartmental committee to review mercury concentrations in Saskatchewan fish. The main purposes of the committee are to advise Saskatchewan Parks and Renewable Resources about licensing restrictions and to develop schedules for monitoring the mercury concentrations in provincial fish.

Revision/Addition to Aquatic Nuisance Control Booklet

The branch has begun updating the guidelines for chemical control of algae and other aquatic nuisances. The Toxicology Research Centre has provided expert technical assistance for this project.

Mercury Clean-Up at Thunder Creek

During 1983-84, the branch continued to monitor water and sediments in the vicinity of the storage site for mercury-laden sediments. These materials were removed from the Moose Jaw River and Thunder Creek and secured as part of a 1981 mercury control project.

CCREM Water Quality Task Force

The branch is represented on the National Water Quality Task Force. The Task force reviews existing water quality guidelines, makes recommendations to Canada Council of Resource and Environment Ministers (CCREM) concerning national guidelines and assesses the ability of current criteria and guidelines to handle water quality issues.

Regina/Moose Jaw Drinking Water

The branch carried out an intensive monitoring program for Regina and Moose Jaw drinking water. This program included tests for unusual bacteria, viruses and actinomycetes. A comprehensive report on the intensive monitoring and on the regular monitoring conducted by the cities was prepared.

Municipal Wastewater Assessment

The branch prepared a report on seventeen of the major municipal wastewater discharges. The report provides an evaluation of the discharge and the effects on the receiving environment.

Sewage Works/Water Works Design Guidelines

In 1968 The Sewage Works/Water Works Design Criteria were published. These guidelines are used to provide consultants and communities with guidelines for the design of water and sewage works. Support documentation for updating the guidelines has been completed and revisions were in progress at the end of the report period.

Drinking Water Chlorination

In response to a number of communities' need to improve chlorination practices, branch staff made a presentation on disinfection of drinking water at regional meetings of the Saskatchewan Urban Municipalities Association.

Criteria for Sewage Lagoon Inspections

Comprehensive guidelines for inspections of sewage lagoon facilities were developed during the fiscal year.

National Working Group on Drinking Water

The National Working Group on Drinking Water Quality was formed in the 1970's to provide recommendations for national drinking water quality guidelines. The result was to develop and publish in 1978 the "Guidelines for Canadian Drinking Water Quality". The Working Group reconvened in 1983 to update some existing parameters in the Canadian guidelines and to develop guidelines for some parameters which were not included. The branch provided a representative on both the former and current Working Groups.

Sampling Guidelines

Sampling Guidelines were developed to aid communities in the collection of water, sewage and surface water samples.

Water Management Service

S.R. Blackwell, Executive Director

D.L. MacLeod, Director
Hydrology Branch

A.L. Jones, Director
Water Rights Branch

Water Management Service

General

The Water Management Service is responsible for overall management and regulation of the province's water resources. Through two of its major branches, the service provides basin studies, streamflow monitoring and forecasting, project operation, central hydrologic and geohydrologic services and licensing of water use and drainage. The service also administers water use, drainage and water use charges, participates in interjurisdictional water matters and maintains water resource inventories.

The Water Management Service has responsibilities for the implementation of three current federal-provincial agreements: The Canada-Saskatchewan Qu'Appelle Agreement, the Canada-Saskatchewan Interim Subsidiary Agreement on Water Development, and the Hydrometric Surveys Agreement.

Qu'Appelle Implementation

On October 6, 1975, the governments of Canada and Saskatchewan signed a ten-year, $33.7 million agreement for improved management of land and water resources and development of the recreation and tourist industry in the Qu'Appelle Valley. Under the terms of the Qu'Appelle Agreement, an eight-member board was established to provide overall management of the agreement and to approve implemention activities designed to meet the objectives of the agreement.

The deputy minister is co-chairman of this board, with the executive director of the Water Management Service serving as an alternate member.

Details of this year's activities under this agreement appear under the Qu'Appelle Implementation Branch section of this report.

Water Development

The three-year Canada-Saskatchewan Interim Subsidiary Agreement on Water Development for Regional Economic Expansion and Drought Proofing (SAW), signed May 17, 1979, was extended to March 31, 1984, primarily to accommodate the completion of the drought studies. The general intent of the agreement is to improve the potential for economic and socio-economic development by lessening the effect of recurrent water shortages, droughts and flooding.

SAW provides for work in three sectors: Sector A - water management activities; Sector B - water supply; and Sector C - flood damage reduction. The purpose of the drought studies in Sector A is to evaluate the impacts of droughts on the Saskatchewan economy and to develop long-term strategies to alleviate the impacts. The results of Phase I studies which provided for the development of an analytical framework were the subject of a workshop in Regina on April 28/29, 1983. At the workshop, management and technical representatives from both senior governments and from a broad range of private interests discussed the drought studies. Work on Phase II, drought sensitivity analysis, was well underway at the conclusion of the fiscal year with plans to complete the drought studies by March 31, 1985.

Sector A also provides for ground water studies and surface water investigations. Three ground water aquifers have been explored:

- Estevan Valley Aquifer near Macoun: a field program was completed in the fall of 1982 and the final report was completed in July, 1983;
- a portion of the Hatfield Valley Aquifer (Melville, Wynyard and Waterhen areas): the Saskatchewan Research Council completed the field work during 1981 and the final report on each of the three areas was completed in September, 1983;
- a portion of the Judith River Formation in southwestern Saskatchewan: the field work was completed by March, 1982 and a draft report on this work was received from the consultant early in 1983.

Sector B provides for the investigation and development of water supply projects. Communities where works have been built or are under construction include Birch Hills, Eston-Kindersley, Humboldt, Kipling, Melfort and Weyburn. A dam for the Village of Ceylon was built in 1983. Centres where investigations have been completed and reports are being prepared include Estevan, Grenfell, Kerrobert and Radville. Investigations are in progress at Canora, Maidstone, Manor, Melville, Redvers and Watrous.

Implementation of certain flood damage reduction measures recommended in the Souris River Basin Report was limited during the report period pending completion of a Saskatchewan review of basic policies and programs. The review is examining programs relating to flood damage reduction including the design flood, designation of flood hazard areas and post-designation provisions.

Canada-Saskatchewan Hydrometric Surveys Agreement

Saskatchewan, represented by the executive director of the Water Management Service, and Canada jointly administer the Hydrometric Surveys Agreement. The administrators of this agreement are responsible for the budget and direction of the technical committee which co-ordinates the day-to-day activities for this monitoring program.

Canada-Saskatchewan Consultative Committee

The six-member Canada-Saskatchewan Consultative Committee on Water was set up under the Canada Water Act for continuing consultation on water resource matters. This includes advice on priorities for planning, conservation, research development, utilization of water, and the formulation, coordination and implementation of water policies and programs.

During the year, the committee met to consider a broad range of water matters including flood damage reduction, water quality, monitoring programs, and interprovincial and international basin activities.

Prairie Provinces Water Board

The executive director of the Water Management Service represents Saskatchewan on the Prairie Provinces Water Board (PPWB). The Board is responsible for administering the 1969 Master Agreement on Apportionment which applies to eastward flowing watercourses, and for cooperation and consultation among the three prairie provinces and Canada on interprovincial water matters.

The PPWB met in May and November during the report year and several matters received attention in addition to the administration of the 1969 apportionment agreement. These matters included projects with interprovincial implications such as the Cold Lake Oil Sands Project and the Cumberland Marshes Project. Water quality was a major consideration, particularly with regard to the Beaver River and the South Saskatchewan River at the Alberta-Saskatchewan boundary. Arrangements were finalized for the 1969 Master Agreement on Apportionment to be amended to accommodate apportionment on Battle, Lodge and Middle Creeks at the Alberta-Saskatchewan boundary. Apportionment of flows on the Boxelder and MacKay Creek Basins was studied. Also, work of an inventory nature on interprovincial ground water along the Alberta-Saskatchewan boundary was initiated by PPWB during the year.

The Hydrology Branch represents the province on the PPWB Committee on Hydrology. This committee is responsible for hydrologic studies needed by the board.

The Water Rights Branch represents the province on the PPWB Committee on Interjurisdictional Agreements Administration. The Ground Water Division of this branch represents the department on the PPWB Committee on Ground Water.

Representation on the PPWB Committee on Water Quality is provided by the Water Pollution Control Branch.

The South Saskatchewan Reservoir Board

The South Saskatchewan Reservoir Board was formed in 1968 following construction of the South Saskatchewan River project. The board consists of two representatives of the province, one of whom is the executive director of the Water Management Service.

The board meets periodically to review project administration and to make decisions on operation planning for Lake Diefenbaker.

The Operations Division provides operation advice to the board, monitors operations and makes day to day decisions in harmony with the long range operation plans established by the board. The board met twice during the report year.

Mackenzie River Basin Committee

The executive director of the Water Management Service continued to serve as a Saskatchewan representative on this committee.

Two meetings of the Committee were held during the fiscal year, primarily to discuss implementation of the recommendations contained in the MacKenzie River Basin Study Report - August, 1981. Of primary interest to all jurisdictions was the first recommendation which called for development of an interjurisdictional agreement on the management of the water resources of the basin. At year end, a general draft agreement had been prepared which lays out the principles and guidelines for the implementation programs; it provides for sub-agreements for specific implementation activities but does not commit any party financially.

Hydrology Branch

- conducts hydrologic investigations associated with basin planning studies and watershed development proposals;
- provides hydrologic service for provincial agencies;
- carries out reservoir and river system operation planning;
- provides a provincial streamflow forecasting service;
- collects basic hydrometric, meteorologic, snow sedimentation and related data;
- maintains liaison with other departments and agencies to ensure coordination in operation and development planning;
- represents Saskatchewan and provides support in administering interjurisdictional water resources.

Committee on Hydrology (COH)

The director of the branch represents the province on the Prairie Provinces Water Board (PPWB) Committee on Hydrology, which provides advice and assistance to the board on all matters relating to surface water hydrology.

During the fiscal year, the committee met on three occasions in consideration of numerous matters. These were highlighted by hydrologic investigations in support of apportionment requirements on westward flowing tributaries of eastward flowing steams; natural flow studies on several small interprovincial basins including Big Gully Creek, Beaver River and Eyehill Creek; determination of irrigation return flows in southern Alberta; and the calculation of evaporation in the prairies. As arranged by COH, Alberta conducted an update of natural flows in the South Saskatchewan River system. The hydrometric station requirements for PPWB were reviewed in general and the Boxelder-MacKay Creeks system was given particular consideration. Monitoring programs for the Saskatchewan river at The Pas and for the Cumberland Marshes Project received special attention. The impacts of drainage on downstream watersheds was also addressed by COH. The question of apportionment of flows on Pipestone Creek at the Manitoba-Saskatchewan boundary was another matter for COH consideration this year.

Qu'Appelle Basin Operation Board

The Qu'Appelle Operation Board, whose members are appointed by the Minister, operates the Qu'Appelle River system to provide maximum benefit for all water users throughout the system. The director of the Hydrology Branch is chairman of this board and secretarial services and advice on operation planning are provided by the Operations Division. The board also has members from Saskatchewan Agriculture, Saskatchewan Parks and Renewable Resources, Agriculture Canada (PFRA) and the Qu'Appelle Public Advisory Council. In 1983-84, three meetings were held to review past operation, to analyse forecasts, and to prepare operation plans.

Saskatchewan Water Project

The director, Hydrology Branch, was extensively involved during the last quarter of the year in assisting the water project office to structure the new provincial water agency.

Souris River Board of Control

This board is responsible for overseeing the apportionment of waters of the Souris River Basin between Canada and the United States under Reference from the International Joint Commission (IJC). The board also provides a mechanism for liaison on all water matters affecting the Souris River, including flow forecasting activities and on new and proposed water developments in the basin. During the year, the IJC expanded this board from two to six members including a representative from each of the Provinces of Manitoba and Saskatchewan on the Canadian section. The director of the Hydrology Branch received appointment as the Saskatchewan member and attended the first board meeting under the new arrangement as the year ended.

Intergovernmental Programs Division

This division is responsible for a range of field and office investigations associated with intergovernmental water activities. The division head continued to serve as provincial co-manager of the Canada-Saskatchewan Interim Subsidiary Agreement on Water Development for Regional Economic Expansion and Drought Proofing. Input to the Canada-Saskatchewan Flood Damage Reduction Program became intermittent with the expiration of the mapping and studies agreement and work was limited to completion of a few outstanding projects. Work under the Canada-Saskatchewan Hydrometric Surveys Agreement was also coordinated for Saskatchewan by this division.

Hydrometric Network

Under the Canada-Saskatchewan Water Quantity Surveys Agreement, water level and streamflow data were collected at 378 hydrometric stations. Provincial responsibilities for operation of these hydrometric stations consisted of 46 lake level and two streamflow stations. The data provide a basis for the management and allocation of water resources in Saskatchewan and with neighboring provinces and states.

Provincial and federal stations are fully funded by the respective governments and the cost of joint federal-provincial stations is shared equally, all in accord with the list shown in Table 12.

Table 12 — Canada-Saskatchewan Hydrometric Network, Breakdown of Funding Responsibilities

Cost-sharing Responsibility	Streamflow	Lake Level	Total
Federal	98	40	138
Federal-provincial	117	10	127
Provincial	53	58	113
Total hydrometric stations	270	108	378

In addition to the network operated under the Canada-Saskatchewan Agreement, the province operated 13 hydrometric stations for special monitoring purposes.

Investigations Division

This division is responsible for conducting hydrologic investigations on various aspects of water resource development and management in Saskatchewan. The investigations include detailed hydrologic studies by basins or regions, hydrologic studies for licensing of community and private projects, safe building elevation studies, flood peak potential studies, environmental impact assessment studies and special studies. The division also supplies technical staff in support of the provincial hydrometric program and provides technical assistance to the operations division for spring runoff forecasting, snow surveys and water flow monitoring during the runoff period.

The division develops computerized programs to help improve work efficiency.

Flood Peak Potential Study For Saskatchewan

Each year, numerous developments on or adjacent to streams and rivers in Saskatchewan require information on the potential for flood peak flows as input to design and construction of water resource structures. As a consequence, a major study was conducted during the year to facilitate the estimation of flood flows, particularly at ungauged locations in the province. A regional approach to the study was adopted. This study provides methodologies for calculating peak flows of various return periods from easily accessible data on climatic and physiographic characteristics of an area under construction.

In addition, the study provides an estimate of the magnitude of peak flows for a range of flood frequencies for most hydrometric stations in Saskatchewan and adjacent areas. The equations derived for calculations of peak flows, along with a provincial climatic and physiographic data base, were presented in the final report in a format compatible with major computer facilities. A computer program was developed in conjunction with the study for estimating peak flows of various return periods for any location in Saskatchewan.

Detailed Hydrology Studies

This activity involves a hydrologic assessment of major project proposals or river basins. 30 major studies were undertaken during the year of which 17 were carried over from the previous year. 18 of these 30 studies were completed in the report year. This work included Quill Lakes basin study and agricultural drainage impact studies on the Carrot River system. Also, work continued in support of the Flood Damage Reduction Program, the Drainage Control Program, the Saskatchewan Water Supply Board, the Conservation and Development Branch of Saskatchewan Agriculture, and the Water Management Service and the Water Rights Branch of Saskatchewan Environment.

Hydrologic Project Studies

During the fiscal year, the division completed 90 hydrologic project studies. These were water development project proposals which include drainage projects under the drainage control program, flood control projects requested by Saskatchewan Agriculture's Conservation and Development Branch, irrigation project proposals requested by the Water Rights Branch and subdivision requests from the Land Protection Branch. Also, requests were received from Saskatchewan Parks and Renewable Resources, the Prairie Provinces Water Board, the Flood Damage Reduction Program, Water Survey of Canada and Saskatchewan Power Corporation.

Water Supply Studies

Studies were completed on 59 small water supply project proposals, most of which were received from the Water Rights Branch. Requests were also received from Saskatchewan Agriculture's Conservation and Development Branch on two irrigation projects and from Saskatchewan Parks and Renewable Resources for a water supply study on a lakeshore recreation proposal.

Safe Building Elevations Studies

During the fiscal year the division analyzed 24 lakeshore subdivision proposals for the Land Protection Branch to determine their susceptibility to flooding.

Flood Peak Potential Studies

During the year, the division completed studies to determine the peak flow potential at 33 locations in the province. Requesting agencies were provided with estimated peak flows for a range of flood frequencies to use in the design of bridges, culverts and water-related structures. Requests for peak potential studies originated primarily from Saskatchewan Rural Development, Saskatchewan Highways and Transportation and the Land Protection Branch of Saskatchewan Environment.

Input to Environmental Impact Assessments

The division examined the hydrologic components of 32 different industrial developments and mining ventures. In most cases the work by the division involved hydrologic evaluations to determine the adequacy of statements made on surface water flows and related works. The results of the examinations were forwarded to the Environmental Assessment Branch.

Special Studies

A number of special studies were conducted by the Investigations Division. These consisted of reviews of other agency reports, the preparation of answers to questions from other agencies or private inquiries, and the compilation of statistical information on water for use by other agencies.

Table 13 — Summary of Study Requests During 1983-84

Requesting Authority	Number of Requests
Saskatchewan Environment, Water Rights Branch	83
Saskatchewan Environment, Drainage Control Program	35
Saskatchewan Environment, Land Protection Branch	40
Saskatchewan Environment, Environmental Assessment Branch	18
Saskatchewan Environment, Flood Damage Reduction Program	3
Saskatchewan Environment, Qu'Appelle Implementation Branch	1
Saskatchewan Highways and Transporation	18
Saskatchewan Rural Development	18
Saskatchewan Agriculture, Conservation and Development Branch	17
Saskatchewan Urban Affairs	3
Prairie Provinces Water Board	3
Saskatchewan Parks and Renewable Resources	3
TOTAL	242

Computer Services

Computer usage as an aid in day-to-day work programs continued to grow during 1983-84 as more staff became actively involved with information processing. As a result, analyst support requirements provided by the branch experienced similar growth in terms of development, maintenance and training needs.

Some of the projects having significant growth and activity were: real-time data acquisition, information processing facilities, drainage control data base, surface and ground water data base enhancements, systems conversion to inhouse micro computers and graphical display of information.

Operations Division

The Operations Division provides a provincial streamflow forecasting and operation planning function. This work involves maintaining a current data base on meteorologic and hydrometric conditions throughout the province and the headwaters of Saskatchewan and Churchill River basins in Alberta. The division's hydrologists use hydrologic models to forecast streamflow peaks and volumes at key locations in the province. The fore casts are used to provide flood warnings, alert officials to possible water shortages and to develop operation plans for major reservoirs, lakes and river systems in the province. The operation planning function involves continuous monitoring of basin conditions and development of operation plans to optimize the various project operations for the benefit of all users.

Streamflow Forecasting Services

The 1983 spring runoff in Saskatchewan ranged in magnitude from well below normal in the Wood River and Beaver River areas to well above normal in the lower Qu'Appelle and parts of the Souris River basin. The forecasting and monitoring effort was weighted towards the Qu'Appelle, Moose Jaw, Wascana, Souris and Assiniboine River basins as in past years.

There were no urban flood problems reported in 1983, as flows were contained within existing channels, and only limited flooding of agricultural land was experienced.

In 1983-84, no major operation planning was required at Boundary or Cookson Reservoirs as the runoff filled each of these reservoirs. The only operations required were to meet small downstream demands for water from storage after the runoff was over.

Churchill River Operations

Streamflow in the upper Churchill River Basin remained below normal in the 1983-84 report year. Conditions improved, however, in the Reindeer Lake basin as the lake level peaked at 335.65 m in mid-November, 0.3 m above the peak level experienced the year before. Flows in the Churchill River at Sandy Bay were reduced to below the plant capacity of the Island Falls Generating Station from May to August, as water was stored in Reindeer Lake, but an increase in local inflow caused by rainstorms in August caused an increase in flows and some water was spilled in September. Flows at Sandy Bay remained at about 600 m^3/s (plant capacity) for the remainder of the report year, while Reindeer Lake had receded to 335.05 m by the end of March, 1984.

Qu'Appelle River System Operations

The 1983 spring runoff in the Qu'Appelle River basin ranged from slightly below normal in the west to above normal in the east and the main stem lakes were within their desirable operating ranges soon after runoff. The level of Last Mountain Lake was above normal at the start of the runoff and rose to 0.15 m above the desirable operating range after the runoff. This relatively high level was directly attributable to the above normal runoff in 1982 in combination with restricted channel capacity in the Qu'Appelle River east of Craven, that prevented releases of water to restore an acceptable lake level prior to the 1983 runoff.

Rain in the Regina area caused increased flows in Wascana Creek in early July. Flows were diverted into Last Mountain Lake, which rose 0.2 m and releases east of Craven were restricted to channel capacity. The flows east of Craven were maintained at channel capacity for the remainder of the year. Summer rain also caused runoff into Katepwa Lake which caused the lake level to rise and downstream flows to increase. In spite of storing water in both Crooked and Round Lakes to levels above the desirable operating ranges, some overbank flooding occurred below Round Lake.

Normal fall operations re-established normal pre-1984 runoff levels on all the Qu'Appelle basin lakes except Last Mountain Lake, which remained above the normal level.

Saskatchewan River System Operation

Flow into Lake Diefenbaker was slightly below normal in early 1983 and when combined with slightly below normal releases, resulted in an April 1 lake level of 549.9 m, 0.6 m above normal. A light snowpack in the headwaters of the South Saskatchewan River, combined with below normal precipitation, resulted in below normal inflow to Lake Diefenbaker for the remainder of the report year. Releases were reduced to near minimum values from late May to early August, yet the peak water level achieved in the lake was only 553.7 m in mid-August, 3.16 m below the full supply level. In the late fall, lake levels reached the lowest recorded values for that time of year since the lake was first filled. As inflows remained low, releases were reduced to well below normal values throughout the winter of 1983-84; thus the rate of lake level decline was slowed down and the level on March 31, 1984 was 550.06 m, 1.1 m above normal. The peak daily inflow to the lake occurred on June 4, 1983 at 495 m^3/s (the normal peak inflow is 1350 m^3/s) while the peak outflow was 280 m^3/s on December 23, 1983.

The North Saskatchewan River at Prince Albert also experienced lower than normal flows in 1983-84. The peak flow for the year occurred on April 21, 1983 at 800 m^3/s, from prairie snowmelt runoff and the melting of the river's ice cover. Flows rose again in mid-July to peak at 615 m^3/s as a result of rainfall runoff in Alberta.

In this report year, no water was spilled from either Lake Diefenbaker or Tobin Lake; all releases were used to generate electricity.

Forecast Model Updating

Forecasting models used in the Saskatchewan River system were developed in the mid-1970's. In 1983-84, work began on updating these models using an extended data base of hydrometric and meteorological records to 1982. These updated models should help to improve forecasting capabilities and to better manage the water in this basin.

On a small scale, work was completed on new forecasting relationships for the East Poplar River basin in which Cookson Reservoir is located.

Water Rights Branch

Surface Water Division

Surface Water Administration

Surface water administration activities for January 1, 1983 to December 31, 1983 are summarized in Table 14.

Table 14 — Surface Water Project Administration Statistics

	1981	1982	1983
New project applications	316	302	235
Project construction authorized	309	235	309
New licences issued	202	120	223
Licences transferred	58	33	221
Licences cancelled (abandoned)	9	95	81
Temporary water use permits	40	15	5
Operational complaint inspections and investigations	47	36	4

During the report period new processing procedures were implemented. These new procedures resulted in improved output by the division in terms of authorizations, licences and transfers issued.

The division spent considerable time on hydrologic studies for Swift Current Creek, Wood River and Frenchman River basins. Water management decisions for Swift Current Creek and Wood River basins are expected in 1984-85. As a result of the Frenchman River basin study some water was made available for a moderate increase in irrigation development.

Request for special operations of reservoirs were made for Junction and Moosomin Reservoirs.

Table 15 shows surface water projects authorized and licenced within the various drainage basins in the province.

International Streams

Under authority of the Boundary Waters Treaty of 1909, the International Joint Commission recommended that the daily natural flows of Battle Creek, Frenchman River, Lodge Creek and the Souris River be divided equally between Canada and the United States. Computations on the first three streams are carried out by federal officials at 10-day intervals during the open water season (March 1 to October 31 inclusive). On the Souris River, computations are carried out following spring runoff and at the end of the calendar year.

Table 16 shows international streams management between Canada and the United States during the 1983 calendar year.

Table 15 — Drainage Basins Showing All Authorized and Licensed Water Development Projects

Drainage Basin		Number of Projects						
Number	Name	Domestic	Municipal	Industrial	Irrigation	Miscellaneous	Total number of projects	*Total storage
1	Lodge Creek	51	1	0	43	1	96	25,321.7
2	Battle Creek	224	0	1	233	6	464	11,592.8
3	Frenchman River	458	1	0	239	15	713	196,390.9
4	Many Island Lake	124	1	0	36	0	161	1,570.5
5	Bigstick Lake	191	0	0	114	6	311	7,473.9
6	Hay Lake	15	0	0	15	0	30	535.9
7	Crane Lake	63	0	0	78	3	144	12,162.3
8	Skull Creek	24	0	0	30	2	56	3,655.2
9	Antelope Lake	43	2	1	27	4	77	1,376.8
10	Swift Current Creek	170	2	4	335	12	523	126,401.8
11	Old Wives (Johnstone) Lake	702	6	2	557	27	1294	35,640.2
12	McRae Creek	18	0	0	5	0	23	388.3
13	Woodpile Creek	15	0	0	2	0	17	214.1
14	Lyons Creek	50	0	0	10	1	61	1,745.8
15	Coteau Creek	51	0	0	11	0	62	320.0
16	Whitewater Creek	147	1	1	46	2	197	2,259.1
17	McEachern Creek	53	0	0	21	0	74	902.9
18	Horse Creek	4	0	0	1	0	5	28.6
19	Rock Creek	5	0	0	1	0	6	18.5
20	East Poplar River	88	1	1	22	0	112	7,480.4
21	Poplar River	24	0	0	3	0	27	201.8
22	West Poplar River	3	0	0	2	1	6	1,210.5
23	Qu'Appelle River	737	44	21	414	87	1303	113,741.4
24	Souris River	253	22	2	140	27	444	108,570.4
25	Manitou Lake	101	2	0	17	2	122	1,392.5
26	Lenore Lake Group	11	5	1	18	2	37	674.7
27	Quill Lakes	38	4	1	18	16	77	24,592.8
28	Carrot River	36	14	2	31	12	95	33,777.9
29	North Saskatchewan River	543	18	14	249	61	885	91,625.8
30	South Saskatchewan River	668	33	13	559	24	1297	10,603,142.9
31	Assiniboine River	87	15	1	54	32	189	32,118.5
32	Swan Lake	2	0	0	4	0	6	288.8
33	Red Deer River (Saskatchewan)	16	11	2	9	14	52	80,569.7
34	Churchill River	8	4	1	7	7	27	12,721.0
35	Athabasca River	0	1	0	0	0	1	.0
36	Great Sandhills Group	123	1	0	61	6	191	8,364.6
37	Willowbunch Group	239	2	1	83	9	334	8,558.4
38	Rush Lake	179	1	0	122	1	303	19,485.5
39	Wildhorse Lake	5	0	0	2	0	7	
40	Climax Group	85	1	0	61	1	148	1,371.5
41	Taits Lake	59	0	0	43	3	105	4,808.2
42	Bluff Creek	16	0	0	2	0	18	234.5
43	Coal Creek	2	0	0	2	0	4	13.7

Table 15 — Drainage Basins Showing All Authorized and Licensed Water Development Projects

Drainage Basin		Number of Projects						
Number	Name	Domestic	Municipal	Industrial	Irrigation	Miscellaneous	Total number of projects	*Total storage
44	Paisley Brook	51	0	0	3	0	54	453.2
45	Big Muddy Lake	119	0	0	29	5	153	4,322.0
46	Missouri Group	59	0	3	22	1	85	2,150.2
47	Little Manitou Lake	16	1	1	13	6	37	848.8
48	Shoe Lake Group	39	0	0	45	5	89	1,775.7
49	Green Lake	1	0	0	0	0	1	20.4
50	Lower Souris River Group	48	6	1	16	8	79	9,612.1
51	Unknown	19	2	1	16	9	47	15,354.4
52	Wood River	472	6	2	129	4	613	
53	Whitebear Lake	40	0	0	8	11	59	1,953.0
54	Coteau Group	16	0	0	1	4	21	722.3
55	Luck Lake	27	2	0	9	0	38	876.1
56	Goose Lake Group	82	2	1	42	6	133	2,946.9
57	Overflowing River	0	0	0	0	2	2	21,246.8
58	Kindersley Lake Group	101	3	1	33	19	157	15,339.4
59	Whiteshore Lake	26	0	1	12	0	39	335.4
60	Redberry Lake	13	0	0	2	3	18	4,048.1
61	Beaver River	2	1	1	7	36	47	80,951.8
64	Wollaston Lake	0	0	1	0	0	1	.0
67	Saskatchewan Lake	3	4	0	3	3	13	91.3
	Totals	6865	220	82	4117	506	11790	11,792,621.4

* dam^3 — 1,000 cubic meters

Table 16 — International Streams Administration

	Battle Creek	Frenchman River	Lodge Creek	Souris River
Calculated Natural Flows at the U.S. Boundary (dam^3)	18,600	44,200	4,660	159,620
Comparison to Normal Flow (%)	57	51	13	125
U.S. Share (dam^3)	9,300	21,100	2,330	19,810
Delivered to U.S. (dam^3)	9,500	23,000	2,480	178,500
Number of Periods in Deficit	8	10	8	0

dam^3 is 1,000 cubic metres

Ground Water Division

Foreword

Ground water resources are an integral and important component of the province's total water resources. It is used by about 45,000 farms and about 350 urban communities, and extensively used by industry for cooling and processing requirements.

Deeper sources of ground water provide reliable supplies of water during periods of drought. Ground water also contributes considerable base flows to the province's rivers, lakes and streams.

Ground Water Administration

There are a total of 1595 ground water projects in good standing, 1369 of which have been issued licensed rights to water. There are 1207 projects for municipal purposes and 349 projects for industrial purposes. Some 14 ground water irrigation proposals were reviewed during the year, several of which proceeded to the ground water investigation stage. Total use of ground water in the province for all purposes is estimated to be about 350,000 cubic metres per day.

Table 17 shows a summary of ground water administration activities for the 1983-84 year.

Project Investigations and Reviews

Information and guidance for the location, development and evaluation of ground water supplies were provided to the communities of Chaplin, Delisle, Denholm, Lumsden, Mankota, Ogema, Pelly, Shellbrook, Snowden and Whitewood, as well as to the fish culture station at Fort Qu'Appelle. Inspections were carried out on ground water projects at Gladmar and a flowing water well at Frenchman Butte.

The division investigated and dealt with 16 complaints regarding lowered.ground water levels. Several water well drilling complaints were reviewed and dealt with.

Geohydrological Services

The division reviewed the ground water component of a brine leakage problem at the International Mining and Milling Corporation potash mine at Esterhazy; leachate containment and the need for additional monitor wells at the Poplar River Project at Coronach; septic tank installation proposal at Cypress Hills Park; the Waterbury Lake uranium project Environmental Impact Statement; the Dust Management program at IPSCO in Regina; the proposal for the Saskatoon landfill; the Wollaston Lake uranium project environmental study; the Regina Waste Management study and review; dyke containment of PCS Lanigan mine; Regina Rail Relocation Project; surface water drainage impacts on the ground water in the R.M. of Buckland, and East Lucky Lake, Kinistino, Quill Lake Basins, Rose Lake and Vanguard areas as well as for the flood control project at Candiac.

The division also contributed to the geohydrological component of the Moose Mountain water study and reviewed the geohydrological component of the Pipestone Creek relating to water losses from the Moosomin Reservoir.

The division carried out a preliminary assessment of the drought sensitivity of urban communities that use ground water. The geohydrology relating to the siting of a bulk petroleum plant at Foam Lake was reviewed and assessed, as were the impacts on the ground water resources from proposed heavy oil development in the Cold Lake-Beaver Lake area.

The division reviewed the geology and ground water components of proposed residential sub-divisons at Pilot Butte and White City. Information and guidance on the location and development of the ground water resources was provided for 25 Indian Reserves in Saskatchewan.

Geohydrological Data Base

Information on the ground water resources and water wells was collected and processed onto a computerized ground water data storage and retrieval system. This system provides the basic data for the provincial ground water inventory and is used extensively to assist the public in locating and developing suitable ground water supplies. Twenty-five sets of micro-fiche records of this data system were distributed throughout the province during the year.

Studies

The division provided geohydrological, consultative and review services for ground water studies under the Interim Subsidiary Agreement on Water. These studies included the Estevan Valley Aquifer System, the Judith River Formation in southwest Saskatchewan and the Hatfield Valley Aquifer System in the Melville, Wynyard and Waterhen areas.

A program was initiated for the preparation of maps of the settled part of the province, showing the location and the depth of major and significant aquifers in the province.

Other

The division participated in the following activities:

- meetings of the Prairie Provinces Water Board Committee on Ground Water in Regina and Winnipeg;
- input to the PPWB's ground water mapping program at the Saskatchewan-Alberta border region;
- iron and manganese removal workshops at Saskatoon and Regina;
- presentation on ground water at a seminar at the Lakeland Community College at Lloydminster;
- annual meeting of the Saskatchewan Water Well Association in Saskatoon;
- Ground Water Protection workshop at Regina.

Table 17 — Ground Water Project Administration Statistics

	1981-82	1982-83	1983-84
Licence applications received	113	90	93
Construction authorized	91	108	94
Licenses issued	102	175	168
Licenses cancelled	8	32	17
Investigation permits issued	123	61	54
Ground water probability reports (written and verbal)	250	200	150
Water well drilling machine registrations	141	147	143
Drilling Reports Received			
Test holes	1,895	930	775
Water wells	3,431	2,230	2,265
Total	5,326	3,160	3,020
Summary of Drilling Reports by Purpose			
Domestic	4,969	2,808	2,851
Municipal	330	222	125
Industrial	5	25	26
Irrigation	22	3	5
Other	0	2	13

Water Power Division

Hydroelectric Generation

The gross hydroelectric power generated in Saskatchewan during 1983 was 2.22 billion kilowatt hours. This was 6 per cent less than in 1982 and 11 per cent less than the average for the past five years. While there was a slight reduction in total power generation resulting from the closure of Eldorado Nuclear Limited's mine and mill near Uranium City, the major reason for the decreased power generation was below normal precipitation and runoff in those areas serving the hydroelectric plants.

The Waterloo Lake and Charlot River projects owned by Eldorado Nuclear limited were not operated during 1984. Only the Wellington Lake project was used to generate power for Uranium City.

Construction of the Nipawin project by Saskatchewan Power Corporation continued with diversion over the spillway structure being scheduled for October 1984.

Drainage Control Division

The division is responsible for the administration of The Drainage Control Act, the mechanism for managing surface water drainage, through permit and complaint processes.

During the report year new regional officers were established in North Battleford and Weyburn. These offices, staffed with one engineer and one technician, were set up to aid in the investigation of drainage complaints.

Drainage Permits

Under The Drainage Control Act permits are required by any person for the construction and operation of drainage works. Table 20 summarizes the drainage applications and permits issued during the fiscal year. Streamlining procedures were carried out which helped speed up the processing time on the issuance of smaller drainage permits.

Drainage proposals are evaluated to determine their possible effects downstream, the sufficiency of the outlet and other environmental concerns. Most proposals require local advertising to allow individuals to make their concerns known.

Drainage Complaints

Landowners with drainage problems, caused by unauthorized drainage works, can file complaints under The Drainage Control Act.

Table 21 summarizes the number of complaints received and the status of those complaints at the end of the fiscal year.

Saskatchewan Drainage Appeal Board

The five member Saskatchewan Drainage Appeal Board was appointed on November 3, 1982 under The Drainage Control Act to hear and determine appeals against decisions, orders and actions made by the department with respect to drainage complaints and drainage permit applications.

Table 22 summarizes the appeal board's activities during the fiscal year.

During the report year, the appeal board hired a part-time secretary with a view to providing the board with less dependence upon the department. Further measures are planned for 1984-85 to provide total independence to the board.

Table 18 — Hydroelectric Power Generated

Year	1000 Kilowatt Hours
1979	2,426,224
1980	2,559,875
1981	2,907,545
1982	2,371,237
1983	2,220,645
Five-year average	2,485,525

Table 19 — Hydroelectric Projects Operations in 1983

Name	Island Falls	Squaw Rapids	Coteau Creek	Wellington Lake	Waterloo Lake	Charlot River
Owner	Province of Saskatchewan	Saskatchewan Power Corporation	Saskatchewan Power Corporation	Eldorado Nuclear Limited	Eldorado Nuclear Limited	Eldorado Nuclear Limited
Water Source	Churchill River	Saskatchewan River	South Saskatchewan River	Charlot River	Charlot River	Charlot River
Capacity	125,000 hp	396,000 hp	252,000 hp	6,600 hp	10,000 hp	15,200 hp
Power Use	Flin Flon Mines Creighton	Saskatchewan Power Grid	Saskatchewan Power Grid	Uranium City		
Power Generated in 1982 (megawatt hours)	709,670	873,080	603,230	23,215	0	0

Table 20 — Application for Drainage Permits

	Incomplete Applications Received		Completed Applications		Permit Issued	
Applicant	82-83	83-84	82-83	83-84	82-83	83-84
C & D area authorities	15	7	8	10	9	5
Individuals and unorganized groups	78	146	52	44	12	44
Municipal	0	11	0	8	0	9
Totals	93	164	60	62	21	58

Table 21 — Drainage Complaints

	82-83	83-84
Complaints received	187	219
Complaints withdrawn	31	42
Decision rendered	42	72
Complaints under investigation	242	347

Table 22 — Appeals to Saskatchewan Drainage Appeal Board

Activity	1982-83	1983-84	Totals to March 31, 1984
Appeals received	6	26	32
Appeals denied	nil	2	2
Appeals withdrawn	nil	1	1
Appeal hearings postponed	nil	3	3
Appeals heard	4	20	24
Decisions rendered	3	16	19
Department decisions affirmed	2	7	9
Outstanding decisions on appeals heard	-	-	5

Wetlands

Staff of the division acted on the existing Technical Advisory Committee to consider agriculture-wildlife conflicts resulting from wetland area development. Committee activities included developing proposals to eliminate or mitigate these conflicts, and making recommendations to the Wetlands Committee to approve or reject proposed developments.

During the year, ten new wetlands projects were submitted for review. Three were investigated and cleared, one was withdrawn during the review process and seven were still under review at year end. Since the beginning of the wetlands review process in October 1971, 431 projects have been introduced into the system, 320 have been cleared, 55 withdrawn and 56 are still under review.

The Drainage Control Division provides secretarial services to the Technical Advisory Committee and the Parent Wetlands Committee. The Wetlands Technical Advisory Committee cleared 24 projects under the rural minicipalities channel clearing policy during the fiscal year.

Qu'Appelle Implementation

Saskatchewan Environment is responsible for administration and coordination of the $33.7 million Canada-Saskatchewan Qu-Appelle Agreement. The ten year agreement terminated on March 31, 1984 and the 1983-84 fiscal period was the final year of implementation activities.

The Qu'Appelle Implementation office in Fort Qu'Appelle was closed on May 1, 1983. The office staff were transferred to the Saskatchewan Environment office in Regina and assigned other responsibilities within the department. Some staff continued the coordination and administration of the implementation activities on a part-time basis until the agreement expired.

During 1983-84 work continued on a number of ongoing programs, and a number of other projects were completed. Work continued to focus on projects to reduce the phosphorus input to the river system from municipal sources as a means of improving water quality. There were also major expenditures on recreation and tourism projects. Total expenditure on environmental improvement, and recreation and tourism projects amounted to approximately $3.5 million, bringing the total expenditures under the agreement to March 31, 1984 to approximately $26.7 million.

Environment Improvement

There continued to be public concern about the effect of water quality on recreation in the Qu'Appelle Valley. An improvement in water quality is essential for further development of the tourism industry.

During 1983-84, water quality monitoring was continued, to more accurately define the nutrient loading into and out of the fishing lakes, the effect of constructed waste treatment facilities on water quality, and trends in nutrient productivity in the lakes. As well, samples of water, sediment and biota were gathered at various locations along the Qu'Appelle River and analyzed for mercury and heavy metals.

The water quality data collected over the past three years was assessed and a report outlining the trends in water quality and the effect of phosphorus control work funded under the Agreement was completed.

Municipal Waste Treatment

The Village of Regina Beach constructed an evaporation pond to store effluent from the community and to reduce their phosphorus contribution to the Qu'Appelle. Future plans include the installation of irrigation equipment for proper disposal of the increased volume of liquid waste.

The City of Moose Jaw continued work on improving and expanding their effluent irrigation project in the Baildon area south of Moose Jaw. Drainage works were constructed for the irrigable lands and additional irrigation equipment was purchased increasing the irrigable area to approximately 2600 acres. Final plans were prepared for construction of additional effluent storage capacity which will eliminate effluent discharge to the Moose Jaw River and increase the water available for irrigation.

Livestock Pollution Controls

During 1984 pollution control works were constructed for 55 livestock operations bringing the total number of projects completed to approximately 175.

All livestock operations west of Lumsden, including the tributaries such as Moose Jaw River and Wascana Creek, now have proper facilities for disposal of liquid wastes from intensive livestock operations. Work east of Lumsden has concentrated on livestock operations located in the valley with limited work on the tributaries.

It is estimated that approximately 125 livestock operations downstream of Katepwa Lake have a potential to contribute phosphorus to the system. Saskatchewan Agriculture may continue the program in 1984 on a smaller scale.

The capital expenditures under the Qu'Appelle Agreement are believed to have kept water quality from deteriorating further. Excessive algae conditions continue to persist in the Qu'Appelle Lakes and there continues to be a strong public demand for an improvement in water quality.

Most point sources of phosphorus contribution to the Qu'Appelle have now been controlled and future efforts should be directed towards reduction of phosphorus levels in the lakes.

Any further water quality in the Qu'Appelle is dependent upon the results of work done to date and an agreement for federal-provincial cost sharing.

Conveyance

It was planned to increase the capacity of the Qu'Appelle River to a minimum of 500 cfs to provide some measure of flood protection to valley bottom lands and lakeshore developments, an assured water supply for future uses and stable lake levels for recreation. The conveyance program is incomplete because of problems in negotiating agreements with valley landowners to acquire the necessary rights-of-way needed to construct the works.

The channel improvements and fish spawning works between Echo and Misson Lakes were completed in 1983.

The Design Team met with landowners between Pasqua Lake and Highway #6 to discuss conveyance plans, review channel alignment and to consider plan revisions.

A draft agreement has been signed with Environment Canada for federal-provincial cost sharing to complete the conveyance program at a cost of $4.75 million over a 5 year construction period.

During 1984 it is planned to construct channel improvements between Katepwa Lake and Mission Lake, and from Craven for 27 kilometres.

Recreation and Tourism

During 1983 significant progress was made in redevelopment of facilities at Regina Beach. The bath change house and maintenance centre as well as a parking lot for 100 cars were completed with substantial landscaping of both the parking lot and beach area.

The relocation of the existing boat launch from Centre Street to a location east of the Regina Beach Yachting Club and development of additional parking for 130 cars and 70 cars with boat trailers on the abandoned CPR property is critical to completion of the project. It is proposed to complete this work in 1984, as well as landscaping along the beachfront between the boat launch and the beach area. This proposed work will reduce the boating and swimming conflicts in the beach area, free up parking for beach users near the beach and improve the aesthetics of the area.

The erection of the tourist information and directional signs along the Trans Canada Highway and the Yellowhead route was completed. The self-guided auto tour route to points of interest, the brochure and other materials will be available for the 1984 tourist season. The signage program and print materials will attract tourists off the Trans Canada Highway and into the Qu'Appelle and encourage use of facilities in the Valley.

The Nicolle Flats nature interpretative area was officially opened on August 27, 1983 and the facilities are now available for year round use of schools and other groups.

The Tantallon park and campground has been completed. This will provide much needed facilities and assist in attracting tourists to the eastern portion of the valley. Future use of the facilities will increase with the completion of the signage program and the resort access road.

Renovation of the Fish Culture Station and construction of the public display area was completed. The displays on fish culture and management, slide presentation and other tourist information will be available for the 1984 tourist season. The facilities will provide an additional attraction in the Fort Qu'Appelle area for visitors, school groups, and other organized groups.

Incentives

Under the Qu'Appelle Agreement, loans and grants are available to encourage private commercial operators to locate in the valley and to expand or modernize existing facilities. Financial assistance, in the form of a non-repayable grant, is available for developments which provide new or improved accommodation, food services and recreation facilities.

During the past year, grants were provided for expansion of the Mission Ridge ski area, renovation of the Lebret restaurant, a new restaurant in Rocanville, a motel complex in Whitewood, and Camp Monahan. A total of approximately $1.0 million in grants was provided under the Agreement to encourage private development of facilities.

Implementation

The Qu'Appelle Agreement was evaluated to determine the benefits achieved in meeting the objectives, to measure the effectiveness with which the agreement was administered and to determine the need for future programs. The consultants reports concluded that the agreement was a qualified success and the Agreement objectives were fulfilled to a fairly significant degree. Although the Agreement did not accomplish all that was originally intended, the work that was completed was important to the valley and its residents. If the Agreement had not been in place the current situation in the Qu'Appelle Valley could be worse than is presently the case.

The total capital investment of over $30 million during the ten year period created 430 person years of construction employment and continuing employment of 50 or 60 jobs in private tourism operations financed under the incentives program.

Administration Branch

R.P. Knoll, Director

Administration Branch

- provides department support services including accounting, purchasing, stenographic, filing, mailing, library and personnel training services, and systems and computer operations;
- maintains operations for the Minister's and deputy minister's offices;
- provides management advisory services to branches;
- coordinates preparation of budget and legislation for the department;
- collects all department revenues under federal-provincial agreements, licence fees and water use charges.

Accounting and Purchasing

This section is responsible for all accounting procedures for the department. This includes processing expenditures, payrolls, purchase of materials and supplies, processing of travel and sustenance claims, budgeting, inventory control, collection of revenue, and maintenance of departmental accounting records and statements.

Steno Services

This section provides stencgraphic and receptionist services for the department. Other services include maintaining attendance records for department staff, updating of computerized department mailing lists and the operation of a word processor for production of the larger reports and repetitive documents.

Records, Postal and Library Services

This section provides centralized filing, mail and library functions for the department.

Staff receive and deliver incoming mail, process outgoing mail, operate a small blueprinting machine, maintain the department's centralized records system, and coordinate the microfilming program for the department.

The library subscribes to periodicals and purchases books, reports and pamphlets for the department. Tne library also obtains inter-library loans, and coordinates department staff requests using the provincial library computer search program.

Drafting and Graphic Services

This section was transferred to the Water Rights Branch at the start of the year.

Personnel and Training

The department filled 6 permanent positions during the year. In addition, 54 temporary, casual and part-time appointments were made. These appointments included students hired for the summer and four students employed under the University of Regina Student Work/Study Program.

Systems Services

The branch continued to coordinate computer systems in the department and conduct systems studies to improve effectiveness and efficiency of department operations. The Systems Centre completed an evaluation of the department's data processing facilities and a proposal for replacement and upgrading was finalized.

Table 23 — Statement of Expenditures and Revenues for the Fiscal Year Ending March 31, 1984

Saskatchewan Environment's operations are financed from the Consolidated Fund in accordance with a budget approved by the Legislature. Spending for the fiscal year ending March 31, 1984 was as follows:

Expenditures

Administration Branch	$ 729,450
Environmental Information, Co-ordination & Assessment Service	809,231
Air Pollution Control Branch	447,829
Water Pollution Control Branch	1,103,564
Land Protection Branch	983,303
Mines Pollution Control Branch	511,365
Hydrology Branch	2,035,917
Water Rights Branch	1,418,787
Qu'Appelle Implementation Branch	59,494
Grants to Organizations for the Purpose of Advising the Minister of Environment on Environmental Concerns	73,938
Total	$8,172,878

Saskatchewan Environment collects licence and permit fees under The Water Rights Act, The Ground Water Conservation Act and The Drainage Control Act; collects charges for water use under The Water Resources Management Act and collects rentals for water use under The Water Power Act. It also receives revenues from other governments for work done or services provided under intergovernmental agreements.

These revenues are deposited in the Consolidated Fund through Saskatchewan Finance.

Revenues

The Water Rights Act - fees	$ 6,635
The Ground Water Conservation Act - fees	3,305
The Drainage Control Act - fees	4,875
The Water Resources Management Act - water charges	190,991
The Water Power Act - rentals	912,309
Other Governments - Canada	330,741
Total	$1,448,856